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Skeptical Inquirer

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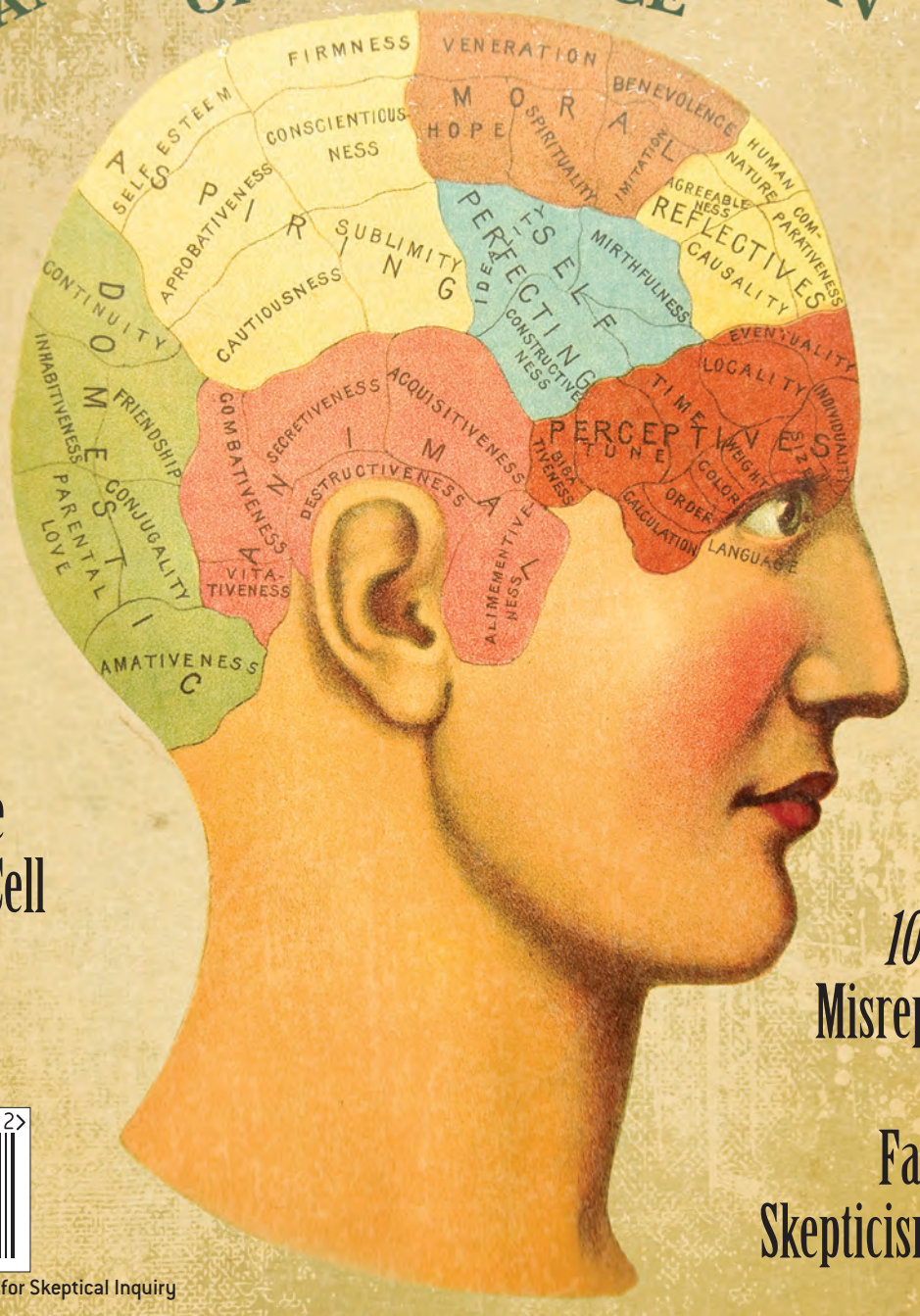
PHRENOLOGY AND THE GRAND DELUSION OF EXPERIENCE



Pseudoscience of Live Blood Cell Analysis

Critique of Homeopathy Research

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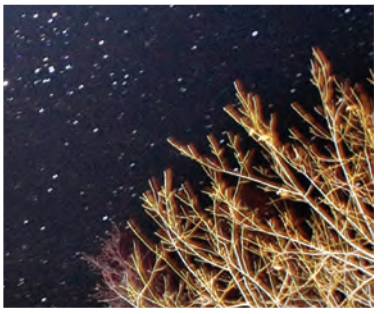

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[FROM THE EDITOR

Phrenology's Lessons for Today

Looking back from today, it may be difficult to appreciate the hold the pseudoscience of phrenology had on society in Britain, Europe, and America in the nineteenth century. It seemed a sparkling new science, based on the physical anatomy of the skull, not mystical ideas. Prominent scientific figures such as Alfred Russel Wallace and Thomas Edison testified to its value. Phrenology's impact was felt nearly everywhere, and as Geoffrey Dean shows in this issue it influenced anthropology, criminology, education, medicine, psychiatry, art, and literature. It was warm and satisfying, and it seemed to work. Yet it was all a delusion.

How could such a thing happen? How could something with no real validity seem to so many people to be accurate? Dean explores this question and provides a variety of valuable insights. Seeing what we want to see, looking only for confirming evidence instead of giving equal weight to contrary evidence, adherents quickly created—through their own personal experience with phrenology—a nonfalsifiable system, what Dean calls "the grand delusion of experience." Only through the filter of time can we see it clearly as classic pseudoscience.

Dean, a Committee for Skeptical Inquiry fellow, is well known and widely respected for his careful, comprehensive critiques of various forms of astrology. His two-part SKEPTICAL INQUIRER series "Does Astrology Need to be True?" (Winter and Spring 1987) is republished in the SI anthology *The Hundredth Monkey* (Prometheus Books).

Phrenology may be thoroughly discredited today, but the same kinds of processes that led to its wide acceptance are no less active now. The cautionary lessons phrenology holds for us all are right there for us to see, but the processes that reinforce our own predispositions and beliefs continue their strong hold and screen us from too clearly seeing the truth.

Homeopathy is, to most skeptics, a modern-day equivalent of phrenology. To the scientific-minded it has no validity, but, like phrenology in its age, is popular and widely used. In this issue, another international expert and CSI fellow, Edzard Ernst, examines all the clinical studies of homeopathy published from 2005–2010 by the most prolific study group in the world. Many of them assert some slight validity to homeopathy, but Ernst finds them riddled with problems. A frequent contributor to SI, Ernst has published over a thousand papers in peer-reviewed journals, including 300 systematic reviews. Much of this great body of work undermines assertions of so-called alternative medicine.

* * *

I hope you enjoyed our Art and Skepticism special issue (September/October 2012). Deputy Editor Ben Radford conceived and planned it, and invited the skeptic artists and writers whose work graced its pages. I found it lively, fresh, and invigorating—a visual as well as intellectual feast.

Amid this electoral season's dreary and divisive political news, it was refreshing to see televised images of scientists wildly cheering. Twice. One was for the discovery of the Higgs boson (see page 27), the other for the landing of the *Curiosity* roving laboratory on Mars. Science has a wonderful way, for a while at least, of lifting us up out of our usual mundane conflicts and concerns.

—KENDRICK FRAZIER

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Inquiries from the media and the public about the work of the Committee should be made to Barry Karr, Executive Director, CSI, P.O. Box 703, Amherst, NY 14226-0703. Tel.: 716-636-1425. Fax: 716-636-1733. Email: bkarr@centerforinquiry.net.

Manuscripts, letters, books for review, and editorial inquiries should be sent to Kendrick Frazier, Editor, SKEPTICAL INQUIRER, 944 Deer Drive NE, Albuquerque, NM 87122. Fax: 505-828-2080. EMAIL: kendrickfrazier@comcast.net. Before submitting any manuscript, please consult our updated and expanded Guide for Authors for styles, reference requirements, and submittal requirements. It is on our website in two formats at www.csicop.org/publications/guide.

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Greek Government Takes Action against Maker of Nanobionic Clothing

Simon Davis

Following an investigation published by journalists Kostas Vaxevanis and Stefanos Gogos, the General Consumer Secretariat (GCS), a Greek government agency, ordered the immediate removal of key health and product claims by Viotech Ltd., makers of the Nanobionic clothing line.

Nanobionic products include vests and T-shirts that retail for 298 euros ($366). The company claims on its website that each product "offers relief, increases strength and stamina, reduces fatigue, and offers a sense of well-being. Suitable for better recovery." Vaxevanis and Gogos claim to have information indicating that over 20,000 vests have been sold, estimating the company's revenues at over 6,000,000 euros ($7,426,000).

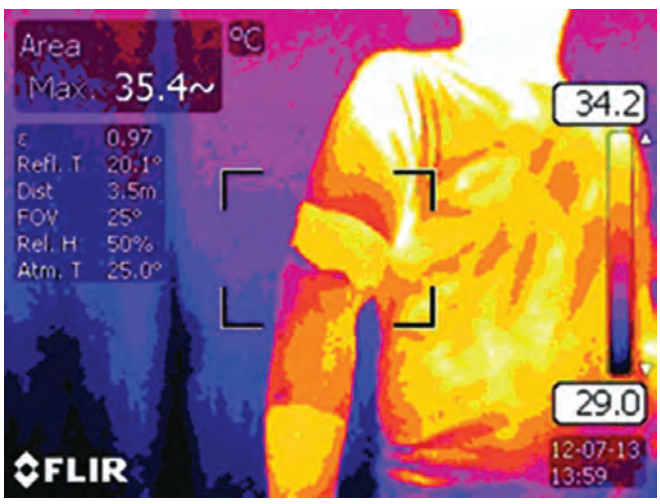
The products are frequently featured on the television show of well-known Greek journalist Makis Triantafyllopoulos. The Vaxevanis/Gogos investigation of Nanobionic was published in the July 19, 2012, issue of the Greek magazine *HOT DOC*.

As reported on Vaxevanis's news website on August 6, 2012, the GCS issued an announcement asking Viotech Ltd. to withdraw all claims of beneficial health effects since all available data about the claims lack scientific documentation. As for the the claim about reflecting infrared rays back to the body, the GCS had doubts about whether Nanobionic products could do this to a greater degree than a conventional fabric. In addition, the announcement mentions "consumer deception" because "the impression is given that the products are distributed by a multi-national company." The GCS also asked for the removal of the claim that the company's cited study was conducted "under the supervision of the University of Athens"—this after the *HOT DOC* investigation and an official denial by the university's dean.

Viotech Ltd. is based in a suburb of Athens and does not list any domestic distributors or retailers on its site. The company sells directly to consumers and accepts orders via phone and its website. The only other known Greek retailer for Nanobionic is the zougla.gr website, which is the online presence for journalist Triantafyllopoulos. Triantafyllopoulos frequently features stories relating to Nanobionic on his late night television talk show, often accompanied by Viotech's phone number featured prominently so that viewers can place orders.

On June 26, Vaxevanis and his team featured a story on his investigative journalism show on the Greek state television broadcaster on how bad science was used to make misleading claims for marketing purposes. The products in the story were cosmetics, hologram bracelets, and so-called "nano-vests." The latter are sold by Nanobionic—but not exclusively. The show made no mention of brands and obfuscated all company logos. Nonetheless, this led to an immediate response by Triantafyllopoulos, who devoted an entire show a few days later to questioning Vaxevanis's claims and reiterating his belief in the efficacy of Nanobionic based on the numerous testimonials by customers—including famous athletes—that he played for his audience.

According to Vaxevanis and Gogos, this is what prompted them to publish an investigation specifically into Nanobionic and its relationship to Triantafyllopoulos. The relationship appears quite close; Nanobionic is based in a building owned by the Triantafyllopoulos family that also houses his official website zougla.gr. At the time that the *HOT DOC* article was being written, a sign above the Nanobionic offices stated "Under the supervision of the National



As shown in an experiment, the Nanobionic product does not reflect far infrared waves back to the body as Viotech Ltd. claims. Arm area: Tmin 31.3°C, Tmax 34.1°C. Nanobionic surface: Tmin 30.9°C, Tmax 33.5°C. T-shirt surface: Tmin 30.4°C, Tmax 34.1°C.

Capodistrian University of Athens." The principals for Viotech Ltd. are the Psipsikas brothers. George Psipsikas is a frequent guest on Triantafyllopoulos's show, particularly when Nanobionic products are being discussed. Viotech Ltd. did not respond to a request for a statement regarding the investigation by Vaxevanis and Gogos.

According to the company's official website:

> Nanobionic® intelligent clothes reflect the energy emitted by the human body, which is 80% infrared waves (IR) and transform it into Far Infrared Waves (FIR).
>
> The reflection of our body's Infrared Rays, with the use of Nanobionic® products, essentially penetrates our body at a depth of approximately 4 cm, creating a sweet warmth, with an effect on the tissues and cells, helping in their faster regeneration.
>
> The result from the use of Nanobionic® intelligent clothes could be significant improvement in performance. Nanobionic® technology may increase endurance, cardio respiratory stamina, anaerobic capacity, strength and flexibility. It could also reduce lactic acid, heart rates, premature fatigue and sweating. Nanobionic® clothes may be also used for faster recovery.

Vaxevanis and Gogos sent Nanobionic product literature to Theodoros Samaras, associate professor of physics at Aristotle University and and a specialist in infrared waves and asked him if the company's claim could be true. His answer: "Infrared waves cannot penetrate the skin at the depth the company claims, since they do not go past the stratum corneum, which is the layer that contains dead skin cells. Given that under normal circumstances over 50 percent of the body's heat is released through this mechanism (Cameron J.R., Skofronick J.G., Grant R.M.; *Physics of the Body*; 2nd edition, 1999; Medical Physics Publishing), this does lead to questions about possible negative consequences of wearing these garments, especially by groups with reduced thermoregulatory capabilities."

Having thus ruled out any known theoretical health benefits in the company's claims, Vaxevanis and Gogos set out to examine the product itself. Their first step was to purchase an ankle brace for fifty-nine euros ($72) plus a value added tax of 13 percent. This is not the value added tax rate for retail clothing, but rather for medical products. The label designates it as an "orthopedic product" with a composition of "Polyamid 55%, Elasthan 45%, Ceramic Textile." This indicates a polymer fabric with a ceramic texture, similar to what is used in curtains, hats, and other general-use fabrics. This was further corroborated by Loukas Margaritis, professor of cell biology and electronic microscopy at the University of Athens, who examined a fragment from the sample product under both a regular and a scanning transmission electron microscope. According to Margaritis in the Vaxevanis/Gogos article: "One side is smooth and the other side has reticulated fibers . . . there are many such types of fabric with a metallic weave and many of them are used to manufacture curtains, mosquito nets, hats, etc. with the purpose of reflecting electromagnetic waves. There is no published peer reviewed study that states that such a product has health benefits."

The next step was to go to the Materials Science and Engineering Department of the School of Chemical Engineering at the National Technical University of Athens (NTUA) where Professor and Deputy Dean Moropoulou and her team examined the ankle brace using a thermographic camera. They placed it on the elbow of one of the NTUA researchers. The purpose of the measurements was to investigate whether this particular product reflects far infrared waves back to the body. In order for this claim to be corroborated empirically, the thermographic readings would have to show a substantially lower temperature on the surface of the Nanobionic product than that of the body.

The readings did not support the company's claim. The minimum surface temperature on the ankle brace was 0.4°C lower and the maximum was 0.6°C lower than on the bare arm. When comparing the arm temperature to that of the T-shirt, the maximum temperature was the same and the minimum was 0.9°C lower. This would indicate that *any* fabric causes *some* change in temperature but nothing that shows that the Nanobionic material behaved substantially differently than the fabric of the researcher's T-shirt. When shown these results, Samaras agreed and also added: "perhaps this is why I was unable to locate any information regarding the physics of how the fabric works (as opposed to biology or medicine)?"

However, the company does cite its own study. As recently as June 23, 2012, Viotech claimed on its website (although as of August 6 this is no longer the case) that:

> The study was conducted under the supervision of the University of Athens, in Athens, in September 2011. The object of the study was the effect of the Nanobionic technology on sports performances. The result of the study was that the Nanobionic® fabric and technology positively affect athletic performance. ALL STATISTICAL DIFFERENCES WERE <0.01.

Specifically, by wearing the Nanobionic T-shirt:

> All the parameters of cardiorespiratory endurance significantly increased.
>
> All the parameters of anaerobic capacity significantly increased.
>
> The explosive strength and power were significantly better in both legs.
>
> The vertical leap was significantly higher.
>
> The flexibility test was significantly better.

When asked by Vaxevanis and Gogos about Nanobionic's use of the university name in its advertising, its dean, Theodosis Pelegrinis, stated: "The University Board has no jurisdiction, nor does the University conduct any studies of this kind. The responsibility for any such study falls exclusively on the individual who conducts it."

The study was presented at the 59th Annual Meeting and Third World Congress on Exercise is Medicine in San Francisco, California, May 29–June 2, 2012. The abstract was included—along with all the other conference presentations—in *Medicine & Science in*

Sports & Exercise, the official journal of the American College of Sports Medicine (ACSM). To date it has not been published in a peer-reviewed publication. ACSM is not an academic institution. According to its website: "We are a worldwide membership organization (like the college of surgeons) for more than 20,000 professionals in the sports medicine and exercise science fields. We don't have a campus or student body, and you can't get a degree from ACSM."

Vaxevanis and Gogos showed the study to Konstantinos Natsis, president of the Sports Medicine Association of Greece. According to Natsis:

> This study has not been conducted by doctors. Someone who has not studied medicine cannot conduct medical studies. Their claims do not hold up scientifically. The sample size (22) is too small and the methodology is not scientifically documented. There is no scientifically documented evidence that would corroborate the properties they assign to this vest. In these cases studies have to be large and need to be proven over a large sample. The study would also have to state the mechanism by which its conclusions are proven. For me to say that I took these some people, did a study, and got these results doesn't prove anything. There is no other published study on the internet or in a journal abroad that relates to this matter, nor an approval by the FDA.

In their article, Vaxevanis and Gogos conclude: "Makis Triantafyllopoulos chose to become a television salesperson for his own reasons. It is his right to do so. All he has to do is drop the facade of journalism and start a telemarketing show . . . it is now the responsibility of the GCS, the National Council for Radio and Television, and of course the District Attorney to intervene. . . . Makis can do whatever he wants—even invent 'nano-shoes' and claim to walk on water like a new Jesus."

Simon Davis is the director of online marketing at a healthcare publications company and event coordinator for the Center for Inquiry–Washington, DC. He was a resident of Greece for twenty-five years.

Cattle Mutilation 'Mystery' Likely Normal Predation

BENJAMIN RADFORD

Ranchers in Colorado are on edge following the latest of several apparent bizarre attacks on horses and livestock—the latest in July 2012. According to an article in the *Denver Post*, "In recent weeks, a horse was shot and had its head skinned at the LeValley Ranch property, which is part of the Esty Ranch holdings about eight miles east of Gunnison. The horse also had its tongue and anus removed. Less than two months ago, a prize heifer in the same heavily traveled area just off of Colorado 50 and Colorado 114 had its tongues, lips, and anus removed. 'To me it looks like a ritualistic issue. Either that, or they are high on drugs. There is just no logical explanation for it,' said Esty Ranch owner Mike Clarke."

The foreman on the ranch stated that though they assumed the animals had been shot, no bullets had been found in the wounds—which made it all the more mysterious. Apparent cattle mutilations have plagued ranchers in Colorado, New Mexico, Texas, and other parts of the Southwest for decades. Many explanations have been put forth, including extraterrestrial aliens, religious cults, and chupacabras.

So far, the favored theory of the fabulists in this case is that the killings are the product of sacrificial rituals. But a look at an earlier, similar case suggests that the deaths were perfectly natural. In many cases mundane explanations have been found for initially mysterious animal deaths. For example, ranchers and police in Colorado's El Paso County were baffled by the strange deaths of sixteen horses and mules in a pasture in 2005. Like the animals on the Esty Ranch, authorities at first believed that the animals had been shot because some carcasses were found with what appeared to be bullet wounds. No other obvious injuries or marks were found on the animals, making the deaths all the more mysterious.

However, a more thorough medical examination found no trace of bullets in the wounds and determined that the injuries were superficial and could not have killed the animals. Finally, veterinary investigators concluded that most of the animals, if not all of them, had in fact been killed by lightning. The mysterious "bullet wounds" never existed. Often, "mysterious" or "surgical" wounds are actually created by ordinary predators and scavengers, both large (such as vultures, ravens, and crows) and small (such as blowflies and maggots).

Blimp Spurs 'UFO' Sighting Over Olympics

Benjamin Radford

A UFO was seen by millions of people hovering over the opening ceremonies at the London Olympics in early August (http://www.youtube.com/watch?feature=player_embedded&v=gtoZSiDZ58k). The glowing craft could be seen during the huge fireworks display at the end. Most people missed (or ignored) it, but one eagle-eyed TV viewer was convinced he'd seen something mysterious.

He posted a video of it on YouTube and it went viral, stirring up controversy around the Internet. Enhancing the video, some saw a dome atop a disc-shaped spacecraft; others at first thought it might be a blimp but realized it wasn't because, as one poster asked, "Why would a company spend millions getting a blimp in the air and then not put advertising on it?"

This is not the first time that UFOs have been sighted flying over or near public events. Though extraterrestrials have been shy about landing on the proverbial White House lawn, they have (allegedly) appeared above huge crowds many times. For example, in December 2011, an unidentified craft was spotted hovering high above an anti-government protest in Moscow's Bolotnaya Square in Russia. It was strangely silent, and clearly not a helicopter. The UFO was caught on video and had some protesters wondering if they were being watched by aliens. Later analysis showed that the UFO was in fact a camera drone used by the news media.

So there's plenty of precedent for unidentified flying objects being seen by thousands—and equal precedent to believe that they are probably not extraterrestrial in origin but instead have an earthly explanation.

In this case, the mystery was finally put to rest after a few days: it was the Goodyear blimp, which had provided aerial coverage of the Olympic festivities. Skeptical Inquirer's own "Psychic Vibrations" columnist Robert Sheaffer, who analyzed the case on his *Bad UFOs* blog, noted that the UFO had already been identified by many people: It was the "Spirit of Safety" blimp. Sheaffer compared the image from the video to photos taken from the website of the Goodyear Blimp: "I think those people know their own Blimp when they see it," Sheaffer concluded. "The resemblance between this object and the unknown object in the video is obvious. Case Closed: The object was the Goodyear Blimp."

Some early commenters stated that the specific blimp was the "Spirit of Europe II," however *Huffington Post* writer Lee Speigel "called Goodyear headquarters and interviewed one of their execs," who stated that it was in fact the "Spirit of Safety." Speigel added, "there's no mystery about why nobody could make out the word 'Goodyear' on the blimp. It was never on the blimp because Goodyear isn't a sponsor of the Olympics."

But, as with most UFO explanations, some true believers insisted that it was an unknown craft, saying for example that the image did not seem to be blimp-shaped. One commenter admitted that the object "looks blimpish," but then (incorrectly) stated that "blimps don't glow." It's true that many blimps do not glow—except when they are brightly lit from below by a world-class fireworks display.

Examiner writer Tom Rose noted, "Ardent believers, some with impressive video analytical skills, are using the web to make their case that the sighting was authentic." For example, one person put up a YouTube video analysis that he believes clearly makes the case that "the object filmed During the Olympic opening ceremony is not a blimp or drone. . . . I am confirming this as a genuine UFO sighting." He did not explain where the Goodyear blimp—which is known to have been in the same location at the same time as the "mysterious UFO"—actually was, if they were indeed two different crafts.

Benjamin Radford is the deputy editor of the Skeptical Inquirer.

Bigfoot Hoaxer Killed in Accident

BENJAMIN RADFORD

A Montana man was struck and killed August 26 while trying to hoax a Bigfoot sighting. The Montana Highway Patrol reported that Randy Lee Tenley of Kalispell was pronounced dead at the scene on U.S. Highway 93 south of Kalispell after being hit by two cars consecutively.

Tenley was wearing a military-style ghillie suit, which is a type of camouflage that resembles vegetation or foliage. Police interviewed Tenley's friends to determine why he would be wearing a full-length dark ghillie suit in the right-hand lane of the highway at night, and were apparently told of Tenley's nocturnal Bigfoot-inspired mischief. Trooper Jim Schneider, interviewed by Daily Inter Lake.com, said that Tenley "was trying to make people think he was Sasquatch so people would call in a Sasquatch sighting. You can't make it up. I haven't seen or heard anything like this before. Obviously, his suit made it difficult for people to see him." Alcohol is believed to have been a factor.

The most famous film of a Bigfoot—one shot in 1967 in Bluff Creek, California, by a man named Roger Patterson—is widely considered a hoax pulled off by a man in a costume. Whether Patterson was the hoaxer or victim of a hoax is unclear, but anyone pulling such a stunt these days is taking a real risk. This tragedy also highlights the prevalence and dangers of Bigfoot hoaxing. It is unknown whether Tenley had pulled the same prank previous times (and therefore may be responsible for earlier Bigfoot reports in the area), but it seems unlikely that he was killed during the one and only time he chose to don the suit to scare people into thinking they saw Bigfoot.

Benjamin Radford is the deputy editor of the SKEPTICAL INQUIRER.

SGU Launches 'Occ the Skeptical Caveman' Video

GURMUKH MONGIA

The folks behind the weekly podcast *The Skeptics' Guide to the Universe* have plans for a brand new skeptical video series called *Occ the Skeptical Caveman*. The pilot episode of this series has already been created and is available for viewing. To ensure a successful run, a Kickstarter.com campaign was set up to generate the funds for the additional four planned episodes.

The goal, set at $17,000, has already been reached. More money will help to increase the production value, so further donations are always welcome at http://www.theskepticsguide.org/store.aspx. Depending on the level of donation, the Kickstarter donors can expect a range of benefits starting at extra video content all the way up to the maximum prize of a guest rogue slot on the podcast, or the option of a speaking role in one of the Occ episodes.

In the show, Douglas Sobon plays Occ, a slightly effete intellectual in a tribe of caveman yokels who, for example, think it's a good idea to urinate on a fire in order to ensure a good hunt. Occ prefers to fix broken spears and work on innovations that will improve the lives of the cavemen in his tribe. Together with his sidekick Pike (played by Bryan Kopp) he challenges the superstitions and fuzzy thinking of his fellow cavemen.

Each episode will feature Occ dealing with a different member of his tribe, each of whom has his own idiosyncrasies and different faulty ways of understanding reality. Though Occ is always the voice of reason, he continually finds it difficult to get his peers to understand his message. This leads to comedic situations that are sure to resonate with anybody who's tried to convince people of reality when they're stuck in their ways.

The idea for this series was hammered out in a writing session that was intended to generate ideas for a video to display at The Amazing Meeting (TAM). At one point in the discussion, the group got to thinking about what it would be like to be a skeptic at different points in history. When they got to thinking about the Paleolithic period, the idea of a skeptically thinking caveman was so appealing that they decided to go with it. Episodes of *Occ the Skeptical Caveman* will be made available on the *Skeptics' Guide to the Universe* YouTube channel (www.youtube.com/user/TheSkepticsGuide) where you can also check out some of their past video projects, such as a parody of a medium's performance called *Passing Away*, and a parody of the classic film *Goodfellas* called *True Fellas*.

Gurmukh Mongia is a computer scientist working in the field of web development. He currently operates a blog and podcast related to critical thinking, *The Dumbasses Guide To Knowledge* (www.dumbassguide.info).

"It is error only, and not truth, that shrinks from inquiry."
– Thomas Paine

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Martin Fleischmann of Cold Fusion Notoriety Dies at Eighty-Five

Martin Fleischmann, one of the two once-prominent electrochemists whose names, for better or worse, will always be associated with the debacle of "cold fusion," died August 3, 2012, at the age of eighty-five.

In March 1989, Fleischmann and colleague Stanley Pons, both then at the University of Utah, startled the scientific world by announcing at a press conference that they had achieved a controlled nuclear fusion reaction in a laboratory apparatus at room temperature. They claimed that they had produced four times the energy put in and that their discovery could lead to an inexhaustible source of energy for the world. This assertion of "cold fusion" was one of the most sensational scientific claims of the century.

The announcement provoked immediate and strong scientific skepticism, since nuclear fusion—the reaction that powers the stars, including the sun—had been thought to require enormous temperatures and pressures.

The fact that the announcement came in a news conference rather than in a legitimate scientific forum and was not yet published in a peer-reviewed scientific journal also raised bright red flags.

A worldwide media storm and a scientific and public controversy of epic proportions quickly ensued. Physicists in particular doubted the claims, and for good reason. Pons and Fleischmann gave no evidence of their reactions having produced neutrons of the high energies expected in fusion reactions.

Major universities and national laboratories in the United States and the United Kingdom quickly set up attempts to replicate or otherwise test the experiments, and they consistently failed to get the same results or show any evidence of nuclear fusion.

Pons and Fleischmann found themselves on the defensive and unable to counter the onslaught of scientific criticism. They maintained their results were real, but most scientists, including those who had been attempting controlled fusion for decades using intense magnetic fields (magnetic confinement fusion) or via intense bombardments with high-powered lasers or particle beams (inertial confinement fusion), remained dubious. A report of the U.S. Department of Energy found no evidence for the effect. Soon the incident became a case study in apparent self-delusion and pseudoscience.

Cold fusion still has its devotees today, although the term itself is seldom anymore used. There are still sporadic claims of excess heat produced in table-top experiments, but no persuasive evidence of true nuclear fusion in them ever surfaced.

A number of excellent books about the cold fusion furor were published. Among them was *Too Hot to Handle* by physicist Frank Close, head of the theoretical physics division at Rutherford Appleton Laboratory in the United Kingdom. He tried to ascertain whether the work of Pons and Fleischmann was "a delusion, an error, or a fraud" and found evidence of all three.■

MonsterTalk Wins Parsec Podcast Award

MonsterTalk, a podcast by SKEPTICAL INQUIRER Deputy Editor Benjamin Radford, Blake Smith, and Karen Stollznow, won a Parsec, a national podcasting award. The Parsecs are annual awards created to recognize excellence in science fiction podcasts and podcast novels. *MonsterTalk* won in the "Best Fact Behind the Fiction" category, for podcasts that "explore the facts that influence the fictions—the science, history, culture, and mythology that inspire these stories."

MonsterTalk is a science show about monsters, an audio podcast that critically examines the science (and sometimes folklore) behind legendary creatures such as Bigfoot, vampires, genies, werewolves, and chupacabras. *MonsterTalk* interviews scientists and investigators who shine a spotlight on the things that go bump in the night.

The award was presented on September 1, 2012, at Dragon*Con, the world's largest science fiction and fantasy conference, held in Atlanta, Georgia, over Labor Day weekend. Podcasts are episodic audio or video downloads similar to radio programs but are typically independently created and produced. *MonsterTalk* began in 2009 and has an archive of nearly seventy episodes. The *MonsterTalk* podcast is available free via iTunes; to listen to shows or for more information, visit www.skeptic.com/podcasts/monstertalk.

Previous nominees and winners of Parsec Awards have included Brian Dunning's *Skeptoid* podcast, the *Geologic Podcast*, *Skepticality*, *The Skeptics' Guide to the Universe*, and the *Astronomy Cast*. For more information about the Parsec Awards, see www.parsecawards.com.

Joe Nickell is CSI's senior research fellow. His books include *Entities* and *Tracking the Man-Beasts*, and he contributed to *The Encyclopedia of Extraterrestrial Encounters*. His website is www.joenickell.com.

States of Mind: Some Perceived ET Encounters

On Tuesday, April 24, 2012, the popular afternoon TV show *Anderson*—hosted by Anderson Cooper—asked, "Are we being visited by aliens from space?" I was invited as a skeptic to provide balance to the three segments: the first introduced a woman who said a bright UFO hovered repeatedly over her back yard; the second featured two young ladies whose UFO sightings prompted them to try hypnosis, which led them to recall interacting with aliens; and finally a self-styled psychic claimed to be in telepathic contact with "star people." A representative from the Mutual UFO Network (MUFON) also participated throughout the show. He was only skeptical of skeptics.

Together, as we shall see, these cases illustrate that UFOlogy continues its long tradition of mystery mongering and the implicit reliance on a logical fallacy called "arguing from ignorance": "We don't know what was seen in the sky; therefore, it must have been an extraterrestrial craft." The cases also reveal that much of what is claimed depends on the states of mind of the alleged eyewitnesses. Following the show I was able to spend more time investigating the cases, and here is a look at each of the three revealing *Anderson* segments in turn.

UFO: 'Hovering' in the Mind's Eye

First up was Denise Murter, age fifty-two, from Levittown, Pennsylvania. Her encounters began in May 2008, when she and her husband were awakened by their growling dog, Alex. Finding nothing unusual in the apartment, she took the dog outside so he could relieve himself. Thereupon, she "noticed a light in the sky," which she guessed to be "about 1000 feet in the air." While it seemed to be "moving very quickly from spot to spot," nevertheless, she stated, "It was hovering over the trees in the yard." There was no noise and Alex became "perfectly well behaved." The light hovered for some twenty minutes, but she does not say what became of it.

The incident was repeated about four weeks later, but the night sky was more overcast, so she said of the UFO that she "could just see parts of it creeping in the clouds." Depending on how it moved, it appeared circular or boomerang shaped.[1] She saw windows that were "bluish green" and "were all the way around the craft." A "little pink light" was following it, and "On the bottom there were three giant headlights in a triangle shape."

After another month, Alex again woke her and she "immediately knew that they were back and I had to go outside again." The craft appeared closer to the house "but still hovering over the trees." Then she saw a beam of light and a sparkling powder that "looked like it was dancing in the trees" (Murter 2012a).

Murter stated, "I was paralyzed. I could not move." She waited until the next day to tell her husband because this particular experience "was just too unbelievable. . . . I didn't want people to think I went bonkers; it was like it was in a movie." Her husband advised her not to tell others of her experience, but she "told MUFON"—the Mutual UFO Network—about it and more (Murter 2012a).[2] Another version of the events, citing a MUFON field investigator, describes "half a dozen sightings" beginning April 20, 2008 (Howe 2008).

The "paralysis"—together with the strange as if "in a movie" experience—provides a clue as to what probably happened on this occasion: Being half asleep (and perhaps having rested on one of the lounge chairs in her back yard to watch the hovering UFO),[3]

Murter had a *hypnagogic experience* (or "waking dream"). This occurs in the interface between being fully awake and asleep. It is typically characterized by hallucinations, often with bright lights reported, and *sleep paralysis*, the body's inability to move because it is still in the sleep mode (Mavromatis 1987, 14–52). This state probably explains Murter's perceived beam of light and sparkling powder. I suspect that during at least part of each of her reported events Murter was not fully awake, and that that affected many of her perceptions.

Regarding the UFO itself, I discussed Murter's sightings with James McGaha, one of our organization's UFO experts and director of the Grasslands Observatory in Tucson. He suggested that the UFO might have a ready explanation, given the direction in which Murter was looking at the approximate times and place reported: that is, a celestial object, some twenty-five times brighter than the stars in her field of vision—namely, the planet Jupiter. That it seemed to move was probably due to the *autokinetic effect* (McGaha 2012). This occurs when one stares at a bright light in the dark, particularly when it is well above the horizon (so there is no frame of reference). Autokinesis is due to "small involuntary jerking movements of the human eye" (Hendry 1979, 26). (In one UFO case, for example, a light that "zigzagged" while remaining in the same basic position for forty minutes proved to be a combination of star and "autokinetic motions" [Hendry 1979, 95].)

As to the shifting colors Murter described, McGaha (2012) noted that that effect would be due to *scintillation*—that is, the "twinkling," not only of stars but also of planets like Jupiter when the atmosphere is especially turbulent. Scintillation can occur on the clearest nights, even affecting a single celestial light, and it results in refraction (bending) of the different wavelengths to cause the changing colors. Like autokinesis, scintillation can also produce "an illusion of motion" (Hendry 1979, 26). Both probably helped cause the illusion of changing shapes Murter described, aided by her own imagination. After the show's taping she sent me an angry note in which she said, "I know what I saw" (Murter 2012b). Actually, of course, this no doubt well-meaning lady only "knows" what she *thinks* she saw.

Anyway, as I told Cooper on his show, it seems farfetched that extraterrestrials would traverse the incredible distances involved—on some secret mission to Earth—then repeatedly hover over Murter's back yard with their bright lights on!

Aliens and Hypnotic Recall

The next segment on *Anderson* featured two young women from Lawrenceburg, Kentucky, Brittany Fields and Jennifer Morgan, who encountered UFOs late one night, then, subsequently, under hypnosis, "recalled" alien encounters.

Their story began April 26, 2011, when, about midnight, the two went on a drive with three young male friends. As they turned down one road and looked over farmland, they saw a light above the trees speeding toward them. Jennifer first thought it could be a helicopter: It was "somewhat long" with lights on the front and back. However, when it flew over them it was "huge," she said, "bigger than a helicopter," and made a noise that was like no helicopter she knew. It sounded like a loud, high-pitched, thumping rhythm. There was also a high-pitched whining noise." Soon, she says, there seemed to be lights everywhere, "red, white, and green," that were "blinking sporadically" (Morgan 2012). Brittany described somewhat similar events, except that she had first thought their initial sighting was of a blimp (Fields 2012).

No doubt the young people saw something, and they categorically deny they were under the influence of alcohol or other drugs. However, the three males' unwillingness to come forward does suggest that they were less inclined to become caught up in the imaginative possibilities (rather like Murter's reticent husband in the previous case).

I also discussed this particular case with James McGaha—this time not in his persona of astronomer but as a former special operations and electronic warfare pilot. He stated that the witnesses' UFO description had "helicopter written all over it." He pointed out that the area was well within the reach of Fort Campbell, Kentucky, which is where American military helicopter training occurs. Stationed there is the famous "Night Stalkers" special-operations unit. (Indeed, it was out of Fort Campbell that the training for the days-later, successful "Night Stalkers" mission against terrorist Bin Laden took place.) The Night Stalkers unit has an impressive variety of huge and odd-looking helicopters that the public rarely sees. Major McGaha suggests that some nighttime helicopter training operation could explain the young people's UFO sighting. As to the red, green, and white lights reported, those are the colors of lights on all aircraft—military or civilian.

Major McGaha suggests that some nighttime helicopter training operation could explain the young people's UFO sighting.

In any event, Brittany says that later, "no one remembers a period of time after we turned left at a four-way stop towards the end of the night." Because of this "missing time" and other concerns, she also contacted MUFON and "They proposed the idea of us getting hypnotized" (Fields 2012). Under hypnosis she "remembered" four small humanoid beings, one of whom held her hand, while the others poked at and examined her body. She "locked eyes" with the entity that was holding her hand and she "felt a flood of emotion." He, too, seemed "overwhelmingly concerned" and "just wanted to make me better." In a second session she explored the period of "missing time" and reported that she and Jennifer had been in a state "like frozen animation" (Fields 2012).

For her part, Jennifer says she "was not as responsive to hypnosis as Brittany." Her session seemed "almost like a dream." "The only thing I can remember," she says, "was seeing a bright light, Brittany pulling off the road, and then literally my memory jumped from being in a car to being in a circular white room." Completely naked, she felt a pain in the back of her head, and later her boyfriend found a scar on the back of her neck that she did not recall having. Did she think she was abducted by aliens? "There's no other explanation. It's the only logical explanation," she concluded (Morgan 2012).

Actually, there is quite another, much more rational explanation for such encounters. They have their origins in a now-ubiquitous UFO mythology. Brittany said, on describing their first sighting, "Listen, I've always believed in this kind of thing" (Fields 2012). The willingness to presume that an unknown object is an extraterrestrial craft (an exercise in illogic called "arguing from ignorance") sets the stage for other expectations. The familiar humanoid likeness, the "missing time," the unremembered scar—these are common motifs of UFO lore.

In fact, there is nothing remarkable about a scar going unremembered, especially in an out-of-sight location. As well, "missing time" may result from nothing more than the percipient having been lost in thought. As to the supposed recall under hypnosis, that is simply mistaking imagination for memory. Hypnosis is merely an invitation to fantasize (Baker and Nickell 1992, 216–31). (Being easily hypnotized is even one of the indicators, though not diagnostic in itself, of a personality type that is characterized by proneness to fantasy [Wilson and Barber 1983]—discussed more fully later.) For these reasons, on *Anderson* I called for MUFON and others to immediately stop using hypnosis to elicit "memories" in UFO cases.

The Star People

The final guest on *Anderson* was a professed psychic named Cassandra Vanzant. She claimed to be in telepathic communication with extraterrestrials, whose messages she "translates." At Cooper's request, she told him he had a star family—the "Lamarians"—who live in "the fourth dimension" (Vanzant 2012). Cooper struggled to keep a straight face, and when he asked the audience how many believed Vanzant could indeed communicate with aliens, just one person raised her hand.

The audience was right to be skeptical. Vanzant is only the most recent "contactee"—one who purports to be in repeated communication with alien beings. (Contactees emerged in the early 1950s but were eventually supplanted by "abductees" who now also frequently serve as cosmic messengers [Story 2001, 134; Nickell 2007, 255–56].) Like others of this ilk, Vanzant exhibits many of the traits associated with a *fantasy-prone personality*. This describes an otherwise normal and sane person with a great tendency to fantasize. Vanzant, for instance, has what seem for all the world like imaginary friends ("Artoli" and "Madascrat"), believes she receives special messages from higher beings, purports to have psychic powers, has had an out-of-body experience, and exhibits other traits that are indicative of fantasy proneness (Wilson and Barber 1983).

When she "channels" her clients' star families, she first speaks to them in the "ET language" ("Twinkle" 2012), which sounds suspiciously like she is just "speaking in tongues." Called *glossolalia*, it is typically "psychobabble," which uses nonsense syllables to create pseudolanguage (Nickell 1993, 103–109). Vanzant subsequently provides "translations" that are rife with New Age clichés, such as "on this earthly plane" and references to people having "their own truths" ("Twinkle" 2012). Revealing, I think, is the fact that Vanzant also talks like this.[4] The evidence suggests that she is herself the source of the "messages." She seems to first fool herself, then other imaginative, credulous folk.

* * *

Like UFOlogical cases generally, these examples from *Anderson* are telling. They illustrate how distorting the eye of the beholder can be, and how—through credulity, pro-UFO bias, illusions and misperceptions, altered states of consciousness, personality traits, and other factors, including a UFO-myth-making culture—it can transform mundane phenomena into perceived alien encounters.

Following the show, Anderson Cooper received flak from flying saucer proponents (like the *Herald-Tribune*'s embarrassingly gullible blogger Billy Cox [2012]) and even a bit from praiseworthy rationalists (like Ed Stockly [2012], who blogs for the *Los Angeles Times* and suggested I did a "fine job" while being "outnumbered"). In my view, Cooper did a very good job, from identifying himself as a skeptic at the outset to giving me the opportunity to respond throughout. As Stockly noted: "Perhaps the best measure of Nickell's effectiveness was shown when Cooper polled the studio audience. Only a few hands were raised when asked how many believed that UFOs were alien visitors, and all but a few hands went up when asked how many didn't believe. Mark that one for the skeptics. It seems that Cooper's audience is on the ball." I would add that Cooper himself led the way. ■

Acknowledgments

I received considerable help with this project from Major James McGaha (USAF Retired) and my trusty assistant Ed Beck, to both of whom I am very grateful.

Notes

1. A photo Murter snapped (see Howe 2008) shows a non-aerodynamic, banana-shaped effect, very grainy or pixelated, probably a photo artifact caused by a point of light photographed by a camera in motion while the shutter is still open (McGaha 2012).

2. MUFON obtained samples from the tree and soil where Murter says the glittering substance fell. Unfortunately, "Three independent laboratories checked the samples *with different results*" (emphasis added); one unidentified lab reported traces of magnesium and boron (Mattar 2008). However, these could potentially be found in some fireworks residues (magnesium being a common ingredient and boron compounds producing a green flame); Pennsylvania is a state where fireworks are legal. Importantly, not one speck of the "glitter" or "little squares of light" was found, either at the site or in the samples (Howe 2008).

3. See photograph in Howe 2008.

4. Of course the "messages" sometimes are in a heightened form compared to her ordinary speech, just as Abraham Lincoln's "Gettysburg Address" has a more elevated diction than his routine letters.

References

Baker, Robert A., and Joe Nickell. 1992. *Missing Pieces: How to Investigate Ghosts, UFOs, Psychics, & Other Mysteries*. Buffalo, NY: Prometheus Books.

Cox, Billy. 2012. Memo to AC: Ditch this gig. Online at devoid.blogs.heraldtribune.com/12997/memo-to-ac-ditch-this-gig/; accessed May 1, 2012.

Fields, Brittany. 2012. In "I Was Abducted" 2012.

Hendry, Allan. 1979. *The UFO Handbook: A Guide to Investigating, Evaluating, and Reporting UFO Sightings*. Garden City, NY: Doubleday.

Howe, Linda Moulton. 2008. Morphing UFO Over Levittown, PA. Online at http://tech.dir.groups.yahoo.com/group/armageddon-or-newage/message/71220?var=1; accessed August 28, 2012.

I was abducted by aliens. 2012. *Anderson* show episode, CBS, aired April 24 (includes aired statements, unused portions, online clips, personal communications, etc.).

Mattar, George. 2008. Fallswoman stars in UFO documentary. Bucks County, PA, *Courier Times*, November 25.

Mavromatis, Andreas. 1987. *Hypnagogia: The Unique State of Consciousness Between Wakefulness and Sleep*. New York: Routledge & Kegan Paul.

McGaha, James. 2012. Personal communications to Joe Nickell, April 9 and 11, May 18.

Morgan, Jennifer. 2012. In "I Was Abducted" 2012.

Murter, Denise. 2012a. In "I Was Abducted" 2012.

———. 2012b. Facebook communication to Joe Nickell, April 16.

Nickell, Joe. 1993. *Looking for a Miracle: Weeping Icons, Relics, Stigmata, Visions & Healing Cures*. Buffalo, NY: Prometheus Books.

———. 2007. *Adventures in Paranormal Investigations*. Lexington: University Press of Kentucky.

Stockly, Ed. 2012. TV skeptic: A 'balanced' discussion of UFOs on 'Anderson.' Online at http://latimesblogs.latimes.com/showtracker/2012/04/tv-skeptic-a-balanced-discussion-of-ufos-on-anderson.html; accessed April 26, 2012.

Story, Ronald D., ed. 2001. *The Encyclopedia of Extraterrestrial Encounters*. New York: New American Library.

Twinkle, Twinkle, Little Star—a Channeled Message by Cassandra Vanzant. 2012. Online at lightworkersworld.com/2012/02/twinkle-twinkle-little-star-a-channeled-message-by-Cassandra-Vanzant/; accessed May 15, 2012.

Vanzant, Cassandra. 2012. In "I Was Abducted" 2012.

Wilson, Sheryl C., and Theodore X. Barber. 1983. The Fantasy-Prone Personality, in A.A. Sheikh, ed., *Imagery: Current Theory, Research and Application*. New York: John Wiley & Sons.

[THINKING ABOUT SCIENCE MASSIMO PIGLIUCCI

Massimo Pigliucci is professor of philosophy at the Graduate Center of the City University of New York, a fellow of the American Association for the Advancement of Science, and author of *Answers for Aristotle: How Science and Philosophy Can Lead Us to A More Meaningful Life*. His essays can be found at rationallyspeaking.org.

Singularity As Pseudoscience

Singularitarianism, the belief that a technological "singularity" event that will radically transform our existence is near, is pseudoscience. Or a cult for middle-aged rich tech people out of Silicon Valley who really don't want to die (think of it as the Rapture for nerds). And yet, it is a fairly popular concept among skeptics, and it is therefore worth taking a closer look at it.

The idea of a coming Singularity has a long history—depending exactly on how you define the concept—but it most prominently traces back to the writings of science fiction author Vernor Vinge, and in recent times has been popularized by futurist Ray Kurzweil (the same guy who made his fame out of his involvement with the development of optical character recognition and speech recognition technologies, and who currently produces some of the most expensive urine on the planet due to the 150 tablets of vitamins he ingests every day to slow down his aging).

The basic concept, as far as one can make it out, is that technological improvement—and particularly computational power—keeps increasing pace and will soon (around 2045, according to Kurzweil's estimates) result in a major discontinuity in human history: the appearance of smarter-than-human computers, which in turn will change the game of history so dramatically that it will be impossible to predict what will happen next.

Which, of course, hasn't stopped Singularitarians from predicting what will happen next. Some take an apocalyptic view of things, à la *Battlestar Galactica*: the Cylons will take over and extinguish the human race (if you don't know what a Cylon is you should stop reading this, go watch the series, and come back later).

There are so many things wrong with the idea of a Singularity that it is hard to disagree with Steven Pinker's general assessment: "There is not the slightest reason to believe in a coming singularity. The fact that you can visualize a future in your imagination is not evidence that it is likely or even possible. . . . Sheer processing power is not a pixie dust that magically solves all your problems."

Still, let me try to briefly sketch the major issues. To begin with, pretty much the only "solid" reasoning behind Kurzweil's projection is a highly dubious generalization of Moore's law—describing advances in computing power—to the whole history of life on Earth. Kurzweil's generalization (which includes a series of "paradigm shifts," from which it is obvious that Kurzweil is unaware of what a paradigm is) arbitrarily mixes and matches events to fit on a nice exponential curve similar to that graphing Moore's law (of which the latter would then be a subset). Of course, Moore's law is not actually a "law" but simply an interesting interpolation describing a specific recent technological trend, and in fact Moore himself thinks that Kurzweil is out of whack in his interpretation of Moore's findings.

Second, to equate computing power with "intelligence" (boy, is *that* one slippery concept!) and then in turn intelligence with human-type consciousness is to commit multiple category mistakes. If there is one thing we have learned from the now multi-decade old "strong" AI program it is that it has been an abysmal failure. Yes, we got Deep Blue and Watson, but that has little to do with actual human intelligence, let alone consciousness. (Please note that I am no mystical dualist, I am simply stating my understanding of the current state of knowledge in cognitive and computer science.)

Third, things become downright bizarre when we get to Kurzweil's optimistic predictions concerning the post-Singularity (which, as I mentioned earlier, he ought not to be able to make, given the very definition of a Singularity, but at this point that's a mere caveat). He is hoping for immortality via something termed "mind uploading," the transfer of his consciousness into a computer.

Now, the first objection that comes to mind has been hinted at above: Why would the super-human intelligent computers bother to give *us* immortality while they could just as easily wipe humankind out and make room for more super-intelligent computers? (Again, see what happens with the Cylons. . . .) Moreover, the whole idea of being able to upload one's consciousness assumes a strong—and not at all validated—version of the computational theory of mind. But that theory is, ironically, a flagrant example of dualism, because it separates what Descartes would have called the *res extensa* (mere matter) from the *res cogitans* (thinking stuff), the latter defined entirely in terms of logical symbols. There is no reason to believe that that's the way consciousness arises, and there are good reasons to think that it is instead a biological process, tightly linked to other biological processes and substrates typical of the kind of animal we are. (To formally abstract from those processes would be like saying that we can upload "breath" while doing away with lungs, to use an imperfect analogy.)

Moreover, if the Singularitarians were to actually get what they wished, they would likely find themselves in a self-made hell. Human psychology evolved alongside a body capable of sensations, emotions, and so on—not just pure thought. An entirely formal, symbolic consciousness (whatever that might mean) would be nothing like a human being and would experience the world much differently than we do. Sounds like a recipe for disaster to me.

Not to mention that, from an ethical perspective, it seems obscene to have a bunch of rich white men salivating after their own immortality in a world where literally billions are either dirt poor or starving to death. ■

Massimo Polidoro is an investigator of the paranormal, lecturer, and cofounder and head of CICAP, the Italian skeptics group. His website is at www.massimopolidoro.com.

Curse That Painting!

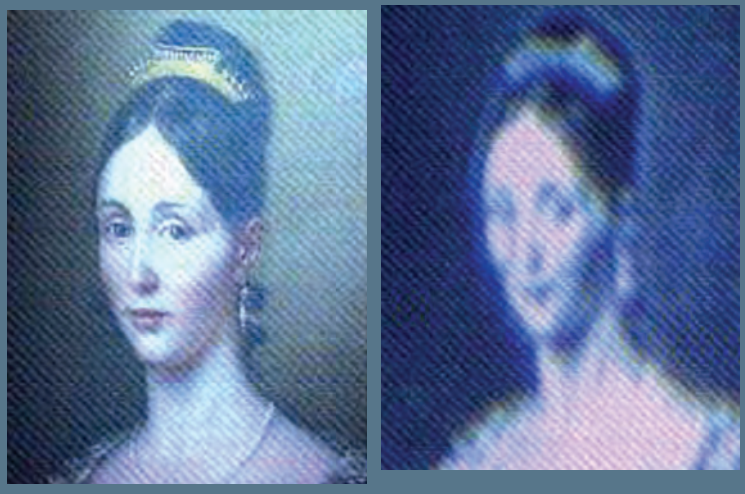
Paranormal legends about paintings have always existed. Some think that a picture falling off the wall represents a bad omen for the person depicted or photographed in it. Others feel watched by some portraits whose eyes seem to follow onlookers as they move through a room. And still others claim that paintings can come alive; people in it can move, smile, close their eyes, or even leave the picture. And, of course, tales of "cursed" paintings abound.

Certainly great writers, from Oscar Wilde with *The Picture of Dorian Gray* to Stephen King with *Rose Madder*, have been able to tell extraordinary stories of scary and unsettling paintings. However, many believe that "haunted" paintings can exist in real life. Coming from a family that has always dealt with paintings—my grandfather is a painter, my father was an art collector, and together with their wives they have run a shop selling paintings for over fifty years—it is easy to understand why this is a subject that particularly fascinates me.

The Hands Resist Him

In February 2000, a supposedly cursed painting was auctioned on eBay. It was titled *The Hands Resist Him* and was painted in 1972 by California artist Bill Stoneham. It depicted a young boy and a female doll standing in front of a glass paneled door against which many hands are pressed. The owners claimed that the characters in it came alive, sometimes leaving the painting and entering the room in which it was being displayed. It was sold for $1,025 to Perception Gallery in Grand Rapids, Michigan, which, when contacted some time later, stated that they had not noticed anything strange since buying the painting.

Luckily for Stoneham, the rumor caused by the story made the painting so popular that it was depicted in a short movie by A.D. Calvo (*Sitter*), as the CD cover art for Carnival Divine's self-titled



Portrait of Teresa Rovere. On the right, seen through a viewfinder, the face seems to smile; it's just an illusion created by the shape of the lens.

The Hands Resist Him painting by Bill Stoneham was sold on eBay as "cursed."

The hysteria grew so wide that the South Yorkshire Fire Service issued a statement dismissing the connection between the fires and the prints.

album, and was featured in the PC video game "Scratches." Today, prints of it—and of its sequel, *Resistance at the Threshold*—are sold in different sizes.

Smiling Portrait

In November 2005, the Italian TV show *Voyager* showed a painting owned by self-proclaimed psychic Gustavo Rol from Turin. It depicted a noble lady, Teresa Rovere, wearing nineteenth century garments and a somber frown. However, when the painting was seen through the viewfinder of a camera the mouth seemed to curl upward, forming a smile. Nothing could be seen with the naked eye and the film recorded through the camera did not show anything unusual. On the show, it was claimed that this was an unexplainable phenomenon, maybe an after-life paranormal experiment of the late Rol. In reality, it was a simple optical effect due to the round shape of the viewfinder, the lens of which tends to narrow and make rounder anything seen through it: thus, the coronet on Teresa's hair seems to bend downward just like the mouth appears to bend upward, creating the illusion of a smile that in reality is not there.

Tears for Fears

The most bizarre and enduring story of all is certainly the "Curse of the Crying Boy," a story told in an article by David Clarke published in *Fortean Times* (July 2008). It all started on September 4, 1985, when British tabloid newspaper *The Sun* published an article titled "Blazing Curse of the Crying Boy." It told of a couple who blamed a cheap painting of a child with big tears on his cheek for a fire that destroyed their house in Rotherham, South Yorkshire. The fire broke out from a pan in the kitchen and spread rapidly. However, the framed print of the *Crying Boy* remained on the wall unscathed.

What made this mundane episode national news was the statement of a local firefighter who said that he knew of numerous other cases where prints of the *Crying Boy* had turned up, undamaged, in the ruins of homes destroyed by fire. *The Sun* was soon inundated by letters telling of similar episodes and a background story for the painting was soon established. First of all, not all paintings were identical. They all were kitschy prints of crying kids, sold in tens of thousands of copies in branches of British department stores during the 1960s and 1970s.

The original painting that started the whole scare was signed G. Bragolin, which *The Sun* claimed was "an Italian artist." Others stated that Giovanni Bragolin was the pseudonym of a Spanish painter, Bruno Amodio, also known as "Franchot Seville." Clarke reports that attempts to trace the man floundered as art historians said he did not appear to have a "coherent biography." Roy Vickery, the secretary of a British Folklore Society, was quoted by *The Sun* to the effect that the original artist might have mistreated the child

One of the many replicas of the *Crying Boy* painting. (Left)

A very rare image of Bruno Amadio painting a *Crying Boy* in his studio (Right)
(Photo © 2012 Massimo Polidoro)

model in some way, adding: "All these fires could be the child's curse, his way of getting revenge."

The hysteria grew so wide that the South Yorkshire Fire Service issued a statement dismissing the connection between the fires and the prints. It explained that the most recent blaze was started by an electric heater left too close to a bed. "Fires are not started by pictures or coincidence," stated Chief Divisional Officer Mick Riley, "but by careless acts and omissions. The reason why this picture has not always been destroyed in the fire is because it is printed on high-density hardboard, which is very difficult to ignite." A bonfire of 2,500 copies of such paintings was even staged by *The Sun* in an attempt to milk every last drop of sensationalism from the news story. After that, the number of tabloid stories began to fade, but the "curse" transformed itself on the Internet into a modern urban legend.

The Legend of El Diablo

Today many people claim that if you treat the paintings well they bring good luck, while others say that if you hang close together the paintings of a crying boy and of a crying girl the house will be protected by any possible danger.

In the end, "a well respected researcher into occult matters, a retired schoolmaster from Devon named George Mallory," was said in the Clarke article to have discovered the origins of the paintings. Mallory had been able to trace the actual artist who had painted the original, Franchot Seville (it was him, then, who used as pseudonyms both Bruno Amodio and G. Bragolin). Seville explained that in 1969 he had found a little street boy wandering around Madrid. The child never spoke and had very sad eyes. Seville decided to paint him, and a Catholic priest, looking at the painting, identified him as Don Bonillo, a child who had run away after seeing his parents die in a blaze. The priest then warned Seville to stay away from Bonillo for wherever he went mysterious fires would break out: the villagers even called him "El Diablo" because of this. Seville ignored him and adopted the boy, using him as his constant model. The paintings sold well but when the studio was destroyed by a fire, the painter accused the child of arson. Bonillo ran away and was never seen again. Only many years later the victim of a car crash was identified as nineteen-year-old Don Bonillo.

In fact, no one named George Mallory, Franchot Seville, or Don Bonillo ever existed. But it doesn't matter, the legend of the curse of the *Crying Boy* is alive and well, just like the paintings that would not die.

The Real Life Painter

In the winter of 2009, I was finally able, by chance, to trace the real artist who had painted the *Crying Boy* series. He was Italian and his name was Bruno Amadio (not "Amodio"). His neighbor Antonio Casellato of Trebaseleghe, near Padua, read an article I wrote about this story in an Italian magazine and sent me a letter. "I knew Amadio very well. I lived in the house next to him for ten years and after his death I have bought his home and all that was in it."

I called Casellato and learned more about Amadio. "He was a marvelous person, always smiling and kind," Casellato told me.

> He was a true artist and taught at the Academy of Venice. His painting style was of very high quality. I own many of his paintings and they are beautiful. That's why I am sorry that he is remembered just for the *Crying Boys*. That was something that he painted just because it sold well [today original copies of *Crying Boys* can reach $3,500]: as good as an artist may be, it is very rare that he can live in affluence. So, since they kept asking him for those paintings from all over the world, he obliged and painted them. But he did so reluctantly, that's why he used a pseudonym, "Bragolin." Do you want to know were that name came from? His uncle, who had worked in vaudeville, used it and had given him permission to adopt it.

In 1981, at age seventy-three, Amadio died of disease of the esophagus and the legends broke out. "Some time ago," added Casellato, "a Swedish journalist came here. He was interested in filming a documentary. He was convinced that Amadio had been a poor child and that he always painted the same subject in the hope to save other children from poverty. He went away depressed when I told him the truth. That's all; I just wanted to say that Bruno Amadio was a real person and not the fictional character of some unlikely urban legend." ■

A "non-crying boy" painting by Amadio: *Pumpkins* (Photo © 2012: Massimo Polidoro).

Sheaffer's "Psychic Vibrations" column has appeared in the Skeptical Inquirer for more than thirty years; its highlights have now been published as a book (Create Space 2011). Sheaffer blogs at www.BadUFOs.com, and his website is www.debunker.com.

National Geographic's *Chasing UFOs*— 'Investigation as Farce'

The latest "reality" TV offering from the National Geographic Channel, *Chasing UFOs* (http://channel.nationalgeographic.com/channel/chasing-ufos/), has succeeded in doing something never done before: bringing UFO proponents and UFO skeptics together to agree that the show is absurd, a travesty of "UFO investigation" that makes everyone look bad. Indeed, some UFO proponents think that because the show is so bad, it might be a government plot to embarrass UFO researchers! Hard-core UFO proponent Robert Hastings quite appropriately says the show is "investigation as farce" (http://tinyurl.com/7tkw69q). He says that its "entertainment-based formula may best be described as *Blair Witch Project* meets Inspector Clouseau. If the show's producers are not secretly in cahoots with some intelligence agency to make legitimate UFO research look bad, by association, they have certainly achieved that outcome inadvertently."

In the show, three investigators travel to places where UFO incidents have been claimed and interview UFO witnesses. One is "Ben McGee, Physical Scientist. The Skeptic." The world of skeptical UFO researchers is pretty small, but I had never heard of this guy. Then there's "Erin Ryder, Tech and Recon. The 'Skeliever'" (groan). They go on: "Lara Croft. Amelia Earhart. Dana Scully. Whether in fiction or nonfiction, there are few hard-hitting, tough-as-nails females as fearless as Erin Ryder." Third is "James Fox, UFOlogist. The Believer." Well, here is somebody who has a track record in UFOlogy. He is a documentary filmmaker, the guy who suggested that Buzz Aldrin was paid off by Paul Allen not to tell his story about how he was followed to the moon by a fleet of UFOs. (http://www.youtube.com/watch?v=FIiZkUr1Njs).

The first episode was "Texas Is For Sightings," mostly about the mass sightings in Stephenville, Texas (not far from Dallas–Ft. Worth), on January 8, 2008. The way they investigate this is to go to Stephenville and arrange a "UFO Town Hall Meeting" to "share stories," i.e., tell random anecdotes about lights seen in the sky. (To a UFOlogist, the plural of "anecdote" is "data.") There was no order to these accounts and no reason to believe that any one account has anything to do with any other.

The UFO Chasers decide to go to a wooded area where sightings were reported—at night, of course. So they attach themselves to absurd-looking night vision equipment with long camera and light booms protruding from shoulder braces, looking very much like people with broken necks wandering about. We repeatedly hear one or another excitedly exclaim: "What the (bleep) was that?" They take a video of a light in the sky "changing sizes," not realizing that is the operation of their camera's auto focus function, trying to bring the light into focus. We hear coyotes howl in the distance, and they have an almost-encounter with a wild boar. Such are the hazards facing those who dare to pursue extraterrestrials. They photograph an aircraft with three lights and wonder if it is from Earth.

In the local library they find an account from 1891 of a meteor that reportedly exploded, showering the area around the Grist Mill with a fine meteor dust. They decide to go investigate that one—in the dark. That it might be easier to find meteor dust in daylight seems not to occur to them. So back on go the ridiculous outfits, and they stumble about some more. Again, they are almost attacked by a wild boar. (Wild beasts supposedly menace them almost every time they go dark-exploring, but we never actually see the animals.) They

photograph a reflective object that appears like it might be circular, but it is suspiciously close to some power-line poles. It looked to me like it could be a light reflection off a transformer on the pole (I have seen such things), but we only see the scene in darkness. It didn't occur to any of them to come back and photograph that same scene in the daylight to find out what it might have been.

There is no mystery about what happened in Stephenville on January 8, 2008. UFO skeptic and retired Air Force pilot James McGaha investigated and submitted his findings to SKEPTICAL INQUIRER editor Kendrick Frazier, who published them in the January/February 2009 issue: "A group of four F-16s from the 457th Fighter Squadron entered the operating area at 6:17 pm local time. A second group of four F-16s entered the same area at 6:26 pm. They departed at 6:54 and 6:58, respectively . . . they were flying training maneuvers that involved dropping extraordinarily bright flares."

Case closed. The Stephenville case was essentially a repeat of the flare drop responsible for the famous Phoenix Lights in 1997. This article is online at http://tinyurl.com/cw6zlbd. Don't the National Geographic researchers know how to use Google? Those responsible for this program must be either incompetent or else deceitful. They must have known that the Stephenville mass sighting was simply a flare drop, but how can you make a mystery out of that?

The second episode of *Chasing UFOs* on the National Geographic Channel, "Dirty Secrets," was one of the most paranoid and absurd pieces of supposedly nonfiction TV that I have ever seen. Apparently the military has constructed an underground base just outside Fresno, California (not recently but about sixty years ago), and uses it to conduct secret research on alien technology and perhaps on the aliens themselves. One woman identified only as "Sarah" and photographed only in shadows, says she has been followed and harassed since she began investigating local UFO activity. Justin and Eva Moncrief claim to have seen a UFO crash near their house and to have seen a caravan of trucks go to the crash site. Justin says he has been "followed," too. We are repeatedly shown the harassing vehicle, a white van, apparently slinking away when observed. Later, they photograph it so clearly that the license plate has to be blocked out while it is on screen. It would be trivially easy for any law enforcement agency to identify this vehicle and its owner, should any of those who claimed to be harassed actually file a complaint.

How to investigate the alleged UFO crash? It's time to stumble around in the dark some more, this time assisted by a FLIR mobile infrared unit. On go the prosthetic-looking neck braces with lights and cameras, and off they go again, *Blair Witch* style, with metal detector and Geiger counter. Apparently they think it's easier to find UFO crash debris in the dark than in daylight. However, they soon spot a vehicle farther up the hill. Convinced they are being followed, Ryder decides they should "call it a night…It wasn't worth taking any chances." There was no attempt to identify the vehicle, or look for crash debris later, in daylight. This whole "crash site" investigation was staged for drama, not to seriously gather any information.

Next was a visit to UFOlogist Jeffrey Gonzales, who says he is being followed, too. He has surrounded his house with a multitude of security cameras. Gonzales is convinced that there is an underground military base north of Fresno that studies alien technology, possibly just beyond the levees of the Fresno Metropolitan Flood Control District. "This levee sits up over the houses"—as indeed it must if it is to provide flood protection—"so it's a beautiful spot to hide something." The white van puts in another appearance.

They decide it's *Blair Witch* time once again, and soon Ben and Ryder are rappelling down a canyon in the dark with their "prosthetic" protrusions to set up a camera on top of the ridge on the other side. We never learn if the camera recorded anything. Meanwhile James and Jeff, also stumbling in the dark, appear to be trespassing by climbing over a tall fence, which has a sign that cannot be read, because it has been blanked out. It probably says something like "No Trespassing, Property of Fresno Flood Control District." There they enter an impressively large tunnel, but it's sealed off and leading nowhere. "We found evidence of an underground facility!" It was later acknowledged that the tunnel was constructed as part of a hydroelectric project. "But they could also be used to access underground bases," said Ryder.

Next is a visit with Manuel Amparano, who claimed to have a close encounter with a UFO on May 13, 1978, when he was a police officer. Tim Printy points out that there is a discussion of the Amparano sighting in his SUNlite Webzine (Vol. 2, No. 4, p. 9). It occurred within two minutes of a known rocket launch from Vandenberg Air Force Base, a launch visible for hundreds of miles.

We are repeatedly shown the harassing vehicle, a white van, apparently slinking away when observed. Later, they photograph it so clearly that the license plate has to be blocked out while it is on screen. It would be trivially easy for any law enforcement agency to identify this vehicle and its owner.

The program reaches the heights of absurdity when the UFO Chasers decide that their next episode of stumbling in the dark should take place in the vicinity of the Fresno Airport. Ryder walks right up to the airport perimeter fence in her ungainly outfit, and at one point actually begins to climb the fence! Here is the clearest proof that we are seeing staged incidents and not actual investigations. Can you imagine the call from an airport security guard to headquarters? "Boss, there's a woman wearing these strange protrusions with cameras and lights, and she's trying to climb the perimeter fence!" In the real world, she would have immediately been arrested for trespassing and then interrogated for days to uncover any links to terrorist organizations. But in the TV fantasy world of *UFO Chasers*, the guard shines a flashlight in her direction, a military helicopter takes off and circles her position, then she rejoins the others to hide under a tree, and the authorities lose all interest in finding out who was trying to penetrate their perimeter.

Episode three, "Alien Cowboys," is set in Colorado, where they begin by investigating the Tim Edwards UFO video from 1995, showing a long, straight object in the daytime sky near the sun. The Chasers are suitably impressed by this video. "Above Top Secret" user ALLisONE posted a photo comparing the "UFO" in Edwards's video to the sun's reflection on a spider-thread (tinyurl.com/chuazvr), and so far that's the best explanation I have seen. The changing shape and size of the object certainly suggests a reflection. They meet with Chuck Zukowski, who investigates alleged "cattle mutilations." Soon it's time for the three Chasers, plus Zukowski, to put on the bizarre-looking devices and stumble around in the dark looking for mutilated cows, since it's obviously easier to find dead cows at night than during daylight.

They next visit UFO raconteur Stan Romanek, one of the least-credible persons in all of UFOlogy. Romanek is the guy who became famous when he posted to YouTube a video of an alien peeping in his window. Soon others were posting alien "Peeping Tom" videos of their own, many of them better than Romanek's. Then Romanek began telling of encounters with as many as nine little alien-hybrid girls, who intrude upon his telephone calls and also play now-you-see-me-now-you-don't. You guessed it: Romanek joins the UFO Chasers in their special Dark-Exploration Suits, and they stumble around not some desolate place, but in the suburban neighborhood where Romanek lives, looking for extraterrestrials. I'm surprised they didn't have an encounter with an ice cream truck.

In episode four, "UFO Landing Zone?" the UFO Chasers jump into "a race to investigate these [crash] claims." Well, it's only been sixty-five years since the "crash" happened at Roswell, so they'd better jump in before the trail grows cold. They stumble around in the dark, as usual, and get all excited over finding a piece of scrap metal, which only at the end is revealed to be tin. Saucer debris, or the remains of some ranch hand's long-ago lunch? They also breathlessly find a military button, later identified as belonging to the U.S. Air Force. Too bad that the Air Force did not exist as a service until September 18, 1947, more than two months after Roswell, and thus the button could not possibly have anything to do with any operation carried out in July of 1947. Roswell proponent Kevin Randle adds, "The button they found seemed to be nearly pristine. I would expect that if it had been buried for any length of time it would have degraded… It is quite clear that the button was planted out there by someone who didn't understand military history, military operations, or the proper wear of the uniform." (tinyurl.com/d755nm6).

Randle checked with the White Sands Missile Range about the supposed UFO bounce-and-crash video presented by Ted Loman that we see repeated over and over, research that the UFO Chasers seemingly could not bother to do. He was told that it was part of "an infrared shot of a Navy missile test." Case Closed—but by Randle, not by the UFO Chasers. Ben McGee left a comment on my *BadUFOs* blog that "we were aware of and discussed the Navy's statement on the bounce-and-crash rocket video on camera at the very onset, prior to meeting Ted Lohman [*sic*]. The conversation, however, simply never made the final cut" (tinyurl.com/c3yas7k). In other words, the show was edited to promote mysteries and exclude explanations.

Lee Speigel wrote a *Huffington Post* article on July 25, 2012, titled "Chasing UFOs' Stars Blast Their Own Show" (http://tinyurl.com/cta98vu). "On the heels of less-than-positive reviews and viewer comments, two of the show's stars—James Fox and Ben McGee—revealed their own dissatisfaction with *Chasing UFOs*, complaining that the show had placed more emphasis on entertainment value than a serious look at the UFO subject." James Fox wrote on Leslie Kean's Facebook page that "I know how disappointed all of you are. I am too. It's not the show that was sold to both myself and scientist Ben. . . . My credibility and reputation has, deservedly, taken a serious hit." Ben McGee wrote, "James and I both had expectations and (for our own reasons) hopes of an ultimately serious product. We both saw the project heading in a different direction as time went on and were powerless to influence it. Injecting science into mainstream media is also problematic, and I am suffering heat in my own circles for the lack thereof on the show."

But National Geographic apparently got what it wanted: they told Speigel that "*Chasing UFOs* has been the highest-rated Friday night series on the channel since 2009. . . . NGC averaged its highest ratings ever for Fridays from 10 p.m. to 11 p.m. [the *Chasing UFOs* time slot] for the month of July." ■

Kenneth W. Krause is a contributing editor and "Science Watch" columnist for the Skeptical Inquirer. He may be contacted at krausekc@msn.com.

Exorcising Exercise

The typical commercial gym is a hopeful den of illusions and contradictions. Waves of awkward neophytes and dozy nonstarters cycle thoughtlessly through the weight machines like cans on a conveyor belt. Busy working people dash from one station to the next, iPods a-blast, dodging chatty retirees.

Devotees of the "weight maintenance" crowd linger unwearyingly for an open treadmill or elliptical (*What are those "plyo-whatsit" boxes in the corner for?*). Male weightlifters appear to define fitness by the size and shape of their chest and arms (*Why do cardio when I'm already lean?*). Females, on the other hand, tend to avoid hefty weights altogether, as if their femininity depended on it (*I don't want big muscles!*).

Well-paying customers come and go. A few never get past the first day; some quietly withdraw after a month, maybe a year. Others rematerialize every few weeks, pledging to "get back into it." Those who spend more on trainers never get personally invested. Those who go it alone become frustrated or bored from repetition.

But the regulars know their stuff, right? Think again. Never join a gym expecting to learn anything valuable from the indigenous wildlife. As in any other discipline, success in fitness requires considerable analysis and research—initial and continuing.

So where to start? A good science book, naturally! Put aside the videos and training manuals for now. To build a solid foundation upon which to expand and explore, grab a readable title that relays both long-established and cutting-edge research and debunks some of the most insidious myths in popular fitness. In *The First 20 Minutes: Surprising Science Reveals How We Can Exercise Better, Train Smarter, Live Longer* (Hudson Street 2012), *New York Times* "Phys Ed" columnist Gretchen Reynolds delivers just that.

I know gym-goers who have performed the same program for several consecutive months or even years. When I ask why, they usually say it works for them. Okay, I might pursue, but how do you know it's working? At that critical point, responses grow predictably vague, highly subjective, and increasingly irritated.

In fact, long-term duplication doesn't work for anyone. Bodies adapt to any routine after a few months at most. The exerciser who continues to repeat a program will not only plateau and fail to progress, she will actually lose valuable ground. To at least maintain any level of fitness, step it up as soon as possible. Minds will crave the safe and familiar, but dynamic bodies demand stress and confusion.

So how, exactly, can we ratchet things up? You can advance an endurance program, or achieve "overload," Reynolds concurs, "by increasing the number of times you work out in a week, the length of time each workout lasts, or the intensity of any given workout." The first two strategies simply increase volume and are clear losers in my opinion. First, they leave us with progressively less time to enjoy life. Second, they drastically enhance the potential for injury.

So intensity is key, and no method of achieving it makes more practical sense than interval training (specified periods of exercise followed by specified periods of rest). Apparently enamored of timing protocols generally, Reynolds initially references a Japanese study showing that even *low*-intensity intervals can advance the fitness of middle-aged and senior citizens in terms of blood pressure, leg strength, and maximum oxygen capacity. These subjects walked only, and at intensities of no more than 70 percent of maximum heart rate.

Never join a gym expecting to learn anything valuable from the indigenous wildlife. As in any other discipline, success in fitness requires considerable analysis and research—initial and continuing.

The unfortunate convention at most gyms, however, is "steady-state" exercise, or training at moderate intensities for extended periods of time—much of it wasted, as the scientific facts reveal. Recent professional literature and today's top trainers agree that interval training at *high* intensity is the best method of improving fitness and performance. Be warned, though: "high intensity" means

as hard as you can go—no less. Yes, you can accomplish your goals and save valuable time; but you'll pay in terms of considerable though temporary discomfort.

The classic high intensity interval training (HIIT) study was pioneered by Izumi Tabata in 1996. Therein, athletes performed twenty seconds of all-out exercise followed by ten seconds of rest, repeated continuously for eight cycles. Thus, the "Tabata protocol" lasted only four minutes and was repeated no more than four times per week! Nevertheless, the Tabata athletes achieved similar aerobic and superior anaerobic gains relative to others who performed longer steady-state exercise five times per week.

Reynolds then cites a second Japanese study involving two sets of rats and a barrel of water. Group one rats were forced to swim for two periods of three hours. Group two rats were weighted down—thus boosting intensity—and then subjected to the Tabata protocol for 4.5 minutes. Biopsies revealed that HIIT and steady-state training had resulted in positive and identical molecular changes—a few minutes of intense swimming had generated the same aerobic benefits as six long hours of moderate paddling.

Stunning results like these have been replicated in human studies as well, including the famous stationary bike experiment conducted by Canadian researcher Martin Gibala in 2006. One group of students pedaled at a sustainable pace for ninety to 120 minutes. The second cohort rode all-out for twenty to thirty seconds, rested for four minutes, and then repeated the cycle four to six times (for a total of only two to three minutes of actual exercise). All subjects exercised three times per week. Again, tissue biopsies revealed similar changes at the molecular level, including a marked proliferation of mitochondria, the cellular organelles that create energy.

But traditional HIIT isn't for everyone. Some lack raw talent or tolerance for the burn of rapidly tiring muscles. Others fear exhaustion and the inevitable experience of gasping for air. But HIIT need not proceed by experimental design. Foot, bicycle, and swimming sprints are great, but exercisers should feel entirely free to tamper with both content and timing schemes.

Biopsies revealed that HIIT and steady-state training had resulted in positive and identical molecular changes—a few minutes of intense swimming had generated the same aerobic benefits as six long hours of moderate paddling.

My programs evolve constantly, but I follow a few general guidelines. First, I take a longer, full-body approach by mixing primarily lower-body exercises with their primarily core and upper-body counterparts. Thus, the program extends to twenty to thirty minutes and achieves an exceptionally well-rounded result. But leave the iPod at home—it will only get in your way.

Second, I alternate between bodyweight moves (various forms of squat or lunge, sit-up, and moving plank or push-up), weighted hybrid forms (squat thrusts and sumo high-pulls, e.g.), and explosive power or plyometric exercises (dumbbell snatches, box jumps, burpees, and airborne push-ups, e.g.). Third, I employ various timing protocols, including the Tabata 20-10 ratio and the equally demanding 30-20 ratio. To keep my body "guessing," I plan to insert 60-30 and 120-40 ratios into my program this winter.

But every element in an effective HIIT program must be truly active, engaging multiple muscle groups concurrently. Since neither cosmetics nor static, brute strength are the primary goals, isolation exercises like leg and arm curls and extensions are strictly forbidden. If cardiovascular fitness is your mission, leave those moves to the nonstarters and body-builders. Strength train on alternate days; but even then, opt for more practical compound, or multi-joint, exercises including chest and shoulder presses, back rows, pull-ups, squats, and lunges.

Why stress cardio? In my experience, most men past competition age tend to emphasize resistance training to the point of exclusion, especially if they don't easily gain weight. Either way, they do themselves a tremendous disservice.

First, let's dispel the myth that moderate endurance training makes people skinny. As Reynolds acknowledges, study after study confirms that exercise is largely useless in terms of weight loss. Why? In order to achieve homeostasis, the body compensates for incinerated calories in other ways. You might tend to do less when not exercising, for instance. More disturbingly, however, even small alterations in energy balance can produce quick variations in the production of hormones controlling both appetite (ghrelin) and the processes by which we burn fuel (insulin and leptin). So if you want to lose weight, control your diet.

Cardio's value is enormous for other reasons. "A growing body of science," according to Reynolds, "suggests that aerobic fitness may be the single most important determinant of how long you live, trumping whether you smoke or are obese." One recent study of 10,000 men aged twenty to eighty-two, for example, found that those who were least aerobically fit were most likely to die of any cause at any age. Other research has

identified a person's running mile time as an eerily reliable predictor of future heart disease. In addition to more efficient lungs, respectable endurance programs can produce bigger hearts, more pliable blood vessels, an increased number of capillaries, and stronger muscles. What's not to love?

But such evidence in no way diminishes the importance of resistance training, which in fact can assist in the regression of obesity and the resolution of metabolic disorders. And despite the persistent and popular fiction among women particularly, a serious strength training program will not leave your body bumpy, bulky, or lethargic.

Hypertrophy, the physiological result of effective resistance training, makes muscle fibers stronger and firmer, but not necessarily larger. In order to appear engorged like a successful body-builder—a goal I cannot defend from a fitness perspective—a person would have to lift progressively heavier weights *ad infinitum*, practically mainline protein, and supplement his or her habit with testosterone, human growth hormone, or some other artificial anabolic steroid.

On the other hand, proper strength training has been shown to improve leg strength and speed, for example. It also combats sarcopenia—the loss of valuable muscle mass we experience after reaching our forties, and enhances flexibility—perhaps even more so than stretching (which is overrated, says Reynolds). Explosive exercises especially develop and maintain bone tissue. Indeed, in terms of maintaining control over our aging bodies, proper resistance training might be the most constructive thing we can do.

Finally, I'll offer some practical advice one might never hear in a typical gym. First, keep it functional and forget about cosmetics. Weight machines, treadmills, ellipticals, stationary bikes, and isolation exercises cannot optimize your ability to perform under real world conditions. Instead, choose exercises that require balance and force muscle groups and body parts to work in concert.

Second, modify or even supplant routines quickly and regularly—think weeks rather than months. In addition, infuse each program with loads of variety to keep you mentally engaged and physically immune from adaptation and the plateau effect.

Third, blur the largely artificial lines between endurance, agility, strength, and power training. Be safe but get creative! Engage different types of muscle fiber whenever possible.

Most important, however, treat fitness as a science. To some extent, every participant should conceive of himself as both an athlete and an engineer. To be successful, ignore conventions that waste time or lack direction, and always perform the necessary research before you walk in the door. ■

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[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or coauthor of six books, including *Tracking the Chupacabra: The Vampire Beast in Fact, Fiction, and Folklore.*

Mystery Solved–According to Whom?

Q: What does it mean to have "solved" a mystery in the context of paranormal investigation?

—R. Esau

A: What does it mean for an investigator to have solved a mystery? It's certainly a fair question: What one person will see as a plausible solution to a mystery others will reject out of hand. Some questions may remain after proposing a solution, and it is rarely possible to absolutely prove a case to everyone's satisfaction. Mystery mongers—instead of offering better and more plausible explanations—will sometimes try to nitpick at details to suggest that if every single element of a case is not proven to their complete satisfaction then the entire skeptical solution must be wrong. We often see this ideology in conspiracy theorists and those who deny the "official story" about the September 11, 2001, terrorist attacks. This is also a common tactic among legal defense lawyers who try to magnify any apparent inconsistencies in the prosecution's case into reasonable doubt.[1]

In real-world investigations, information is often incomplete or fragmentary for many reasons: eyewitnesses can be mistaken, records can be lost, forgeries can go undetected, etc. There is often no way to know with absolute certainty what happened in any event; even videotaped recordings can be hotly debated and offer polarized interpretations. Science does not operate on certainties but instead on what fits the facts, what is most likely and probable. In skepticism, as in science, it is not enough to merely criticize or find fault with an explanation; after all, anyone can criticize anything for any reason. Instead, those who challenge skeptical solutions to mysteries must provide a better explanation that fits the known facts.

It also depends on the scope of the mystery you're trying to solve. There's a difference, for example, between investigating one ghost photograph and investigating all the phenomena at a haunted house. In general, the more specific and limited the claim the more likely a case is to be solved. Truly, completely, and definitively solving a large-scale, high-profile mystery takes an enormous amount of work and dedication.

Often people will believe that a mystery remains unsolved because they are simply unfamiliar with (or intentionally ignore) relevant skeptical materials. Was the mystery of the Bermuda Triangle solved over four decades ago with Larry Kusche's book *The Bermuda Triangle Mystery Solved*? I—and most other skeptics—would say so, yet to this day hundreds of writers, websites, and books (including Nick Redfern's 2012 title *The World's Weirdest Places*) insist that it remains an unsolved mystery.

Joe Nickell has debunked the Shroud of Turin to the satisfaction of nearly any skeptic, though many devout believers insist the mystery remains unsolved. Many people believe that I solved the mystery of the chupacabra with my research and 2011 book on the topic, but that doesn't mean that everyone agrees or that the monster will not continue to be presented as an unsolved mystery for years or decades to come. There are ideological and financial incentives for people to deny that a mystery has been solved.

In a way, the question gets to the heart of skeptical epistemology. In one sense, no mystery is ever completely and irrevocably solved, since the nature of scientific knowledge is inherently incomplete. Each fact and theory is only as good as the evidence to date, and it is always possible that new information will cast doubt on (or completely invalidate) the previous explanation.

The real answer, I think, is that a mystery can be considered solved when a sincere, thorough, and skeptical analysis has been brought to a case—one that satisfactorily addresses all the main claims, employing skeptical principles such as Occam's razor in the process. Ultimately, the solution to a mystery is like any other claim or piece of information that people encounter, and it will be accepted or rejected based on many factors, including how knowledgeable they are about the topic and their personal biases. ■

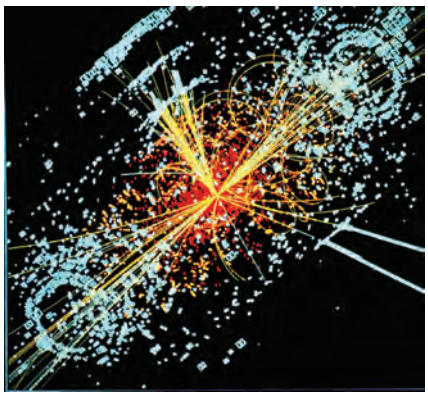
Note

1. One famous example of this occurred in 1995 during the murder trial of O.J. Simpson, in which Simpson was asked to put on a leather glove that had been found at the crime scene. The glove did not fit Simpson's hand (likely because the leather had shrunk after being soaked in blood and repeatedly frozen and unfrozen)—and the defense used that demonstration to dismiss the rest of the prosecution's case as flawed: "If it doesn't fit, you must acquit."

The Higgs Boson and the Future of Physics

MARVIN M. MUELLER

I'm motivated to make several comments about my personal reaction to the Higgs boson discovery, to the extensive media coverage of it, and to what it may portend for the future of physics and cosmology. For context, I'll also comment on two other major physics discoveries in my lifetime.



An example of simulated data modeled for the CMS particle detector on the Large Hadron Collider (LHC) at CERN. Here, following a collision of two protons, a Higgs boson is produced which decays into two jets of hadrons and two electrons. The lines represent the possible paths of particles produced by the proton-proton collision in the detector while the energy these particles deposit is shown in blue.

The two excellent *Nature* articles listed at the end of this essay will also serve to introduce the now-voluminous semi-popular literature on the Higgs discovery.

I feel fortunate, indeed, to have lived in such a colossally productive era for the sciences of all kinds. Every science has been transformed and exponentially expanded by its own "big bang" of new information and (often revolutionary) understanding. The impossible challenge of "staying up" with this hyper-inflation of new worlds of knowledge has made it, for me, into the world's greatest spectator sport. Yet, somehow—in marked contrast to the "dumbing down" of the culture at large—scientific rigor and standards have not only remained high, I believe they have actually risen significantly during my lifetime. Moreover, as attested by publications such as *Scientific American* through the last century or so, the center of overall interest has shifted more and more to the fundamentals, as opposed to applications. As I see it, science qua science has improved noticeably overall—but particularly in the "softer" fields!

In physics, the last seventy years or so have seen innumerable fundamental advances in all branches and have witnessed the unanticipated melding of particle physics with astrophysics and cosmology—certainly a stunning achievement leading to quite different worldviews from those of the past. In those seventy years, I have seen three most notable discoveries: uranium fission in 1938, the neutrino in 1956, and now the Higgs.

In late 1939, at age eleven, I recall reading about the European discovery of neutron-induced fission of uranium in some popular science magazine. It went into some detail about the fission mechanism and the astoundingly great energy produced, and then speculated about using the newfound (in April 1939) neutron-fission chain reaction in uranium to produce a totally unprecedented source of power, as well as an even more incredible bomb. Then, in early 1942, my mother hired a carpenter who had just returned from a six-month stint near Hanford, Washington. He regaled us with tales of the most extensive and, beyond doubt, the weirdest construction project (adjacent to a large river) he'd ever seen—including two-story buildings, partly underground, with concrete walls six to nine feet thick. Yes, I immediately thought of the radiation shielding provided. And so it happened that a teenage boy from a small town in Oklahoma carried the "knowledge" with him throughout WWII that the United States was working on an "atomic" bomb. I couldn't discuss it with anyone because no one I knew (even my teachers) knew any physics at all. (Of course, I tried to learn nuclear physics on my own, but not much was available then—at least in the libraries available to me—because the neutron had been discovered just

ten years before, and everything progressed more slowly back in the thirties. Also, in late 1940, just about everything nuclear became highly classified.)

So much for the discovery of nuclear fission, which, while of huge immediate practical importance to society at large, did not alter the overall foundations of physics to any significant degree, at least compared with the discovery of the neutrino and the Higgs boson. With either of these (but particularly the first) the whole structure of physics would have been changed had the nonexistence of the particle been firmly established. In the case of the neutrino, our basic understanding of astrophysics (stellar evolution and supernovae) would have gone down the drain along with the conservation of energy and momentum—just try to imagine that. In the case of the Higgs, the very existence of stars and planets might well be beyond our comprehension.

Parenthetically (and inconsequentially), I worked next to the apparatus—a large tank lined with hundreds of large photomultiplier tubes, and vacuum-tube electronics by the tens of cubic meters—deep underground where Frederick Reines and Clyde Cowan made the first discovery of the neutrino—from the emissions of a research fission reactor about 150 meters away. I set up an experiment next to their equipment, which they had abandoned several years before to move from Los Alamos to South Carolina where they set up much larger apparatus next to a huge reactor producing plutonium for our stockpile. That is where they finally "clinched the nails" for the Nobel Prize. (Tragically, Cowan died of cancer before he could be awarded the prize.) After most of a year stumbling around their abandoned equipment, I had it removed, and then turned the large underground space into "my" laboratory by installing the usual amenities.

There has been extensive media coverage of the Higgs discovery. By and large, I think it's been good, with far fewer goofs than might be expected, while capturing much of the excitement and exhilaration of a truly history-making event. One flaw in the early articles was in not giving the Higgs *field* its due; but this has been corrected in the later articles, written by more knowledgeable people.

Although the Higgs boson and the Higgs field are two different aspects of the same entity, the aspect of much greater importance is the field since the half-life of the particle, because of its great mass, is so extremely short: ~10^{-24} seconds (in this time, light travels only a little over one-millionth the diameter of an atom, or less than the diameter of a nucleus.) Because of this, the only way to discover the Higgs boson is to create it first, which has now been done in a recognizable manner. From this, we now can deduce with near certainty that the Higgs field exists and is working its wonders in imparting mass to most particles. Yet, many very important details remain to be explained in the future, such as why and how the different species in the "zoo" of particles "soak up" widely different masses through interactions with the Higgs field.

Actually, what has been discovered with near certainty is the existence of a Higgs-like boson; meaning that the data are consistent with the prediction of the standard model of physics. However, the present data are also consistent with other similar bosons, which need to be ruled out before the standard model can be considered confirmed. One example of the many properties of the new boson that need to be confirmed is that it, indeed, has a spin (a key quantum property) of zero; the present evidence also allows a spin of two, which would be disastrous for the standard model. So the full-court press of the Large Hadron Collider's efforts for the next six to seven months will be to collect as much data on the properties of the new boson as possible before it goes offline for two years while it's being rebuilt to give nearly double the present collision energy.

Indeed, now that the standard model of the 4 percent of the universe observable by us at this time has been (at least roughly) completely confirmed—with a lot still hinging on the as-yet-unknown detailed properties of the discovered boson (there could even be more than one type)—the future job of astrophysics and cosmology in elucidating the remaining 96 percent (24

Even after four centuries of mind-boggling, incredible success in explaining the world in non-supernatural terms—as was the unprecedented goal of the ancient Greeks 2.4 millennia ago—physics may just be getting started!

percent dark matter plus 72 percent dark energy) is certainly mind-boggling. But, of course, there still remains an immense amount of work to be done in that 4 percent—the most important, the most critical, and the most challenging being the development and empirical testing of a theory that unifies the standard model with gravitation (quantum theory with general relativity). Actually, physicists are hoping that the new boson will turn out *not* to be exactly as predicted (for nearly a half-century now) by the standard model, because discrepancies are what will probably be needed to point out a new path leading eventually to the grand unification. Indeed, even after four centuries of mind-boggling, incredible success in explaining the world in non-supernatural terms—as was the unprecedented goal of the ancient Greeks 2.4 millennia ago—physics may just be getting started!

However, I think not. My hunch is that it will *not* turn out to be the case that explaining the remaining 96 percent will profoundly alter physics as we now know it. The leading hypothesis (based on present big bang theory) is that dark matter is mostly undiscovered exotic particles produced in the big bang (a misnomer, as so many names are) zipping about universally at near-relativistic speeds without any nongravitational interactions with the 4 percent. If that should turn out to be the case, I don't foresee any severe alterations to present physics. But, this is only speculation at this time.

Dark energy is quite another beast. There are no really attractive hypotheses that I'm aware of. However, it seems reasonable to conjecture that it comes from some basic property of space-time itself, in that it seems to feed on itself as it causes acceleration of the expansion rate of the universe. Hence, my wild guess is that the source of dark energy might just leap out of the equations that ultimately unify quantum theory with general relativity. However, a counter argument might be made that string theory doesn't seem to support this hope.

So, maybe no one can even irresponsibly guess the answer at this time. Nonetheless, my feeling is that any major revolution in present physics is more likely to come from the grand unification than from dark energy in itself. However, in any case, the most likely overall outcome is that present physics will just be extended (as was the Newtonian by the Einsteinian)—instead of overthrown. Such has largely been the history of the first four centuries of the modern incarnation of the "natural philosophy" first conceived by the ancient Greeks, and so named to distinguish it from the pervasive supernatural mode of explanation that had exclusively dominated all of human history before them.

Although we must track down and elucidate that 96 percent, my strong feeling is that the 4 percent created by the Higgs boson will remain, far and away, the dominant interest of the human race. For one thing, I strongly doubt that the 96 percent will exhibit anything like the intricate, intertwined complexity of the 4 percent. In other words, it will be lacking anything resembling a periodic table, the standard model and its denizens, and of course DNA. I liken our universe to a giant ship, with its superstructure being the smaller space where everything interesting (to us, of course) occurs. The passengers generally have little interest in the larger part of the structure, particularly its nether regions, which is what keeps them above water.

Thinking again of those amazing ancient Greeks, at least of the materialists among them who started all this, let me end by quoting Aristotle: "Nature abhors a vacuum." How little he could have known how profoundly true his view would turn out to be! And now we add one more quantum field to the modern vacuum, which is already frothing with incessant quantum activity that could be best understood by a madman. (This quantum conception of an energetically active, roiling vacuum has been solidly confirmed by precisely measuring the attraction of two flat plates for each other when they are separated by several nanometers in a vacuum.) It does not seem possible for nothingness (as known to physics) to exist anywhere at any time!

Putting aside my several speculations, hasn't this been a truly marvelous period of human intellectual history to have witnessed? One hundred years ago, the existence of atoms had just been established beyond doubt; there was no atomic structure, the source of the sun's power was a total mystery as was biological inheritance, and the (static) universe comprised only what we now call the Milky Way galaxy. Count your blessings! ■

For Further Reading

Brumfiel, Geoff. 2012a. Higgs triumph opens up field of dreams. *Nature* (July 10). Online at www.nature.com/news/higgs-triumph-opens-up-field-of-dreams-1.10970.

———. 2012b. Theorists feast on Higgs data. *Nature* (July 18). Online at www.nature.com/news/theorists-feast-on-higgs-data-1.11018.

Marvin M. Mueller, PhD, is a physicist retired from Los Alamos National Laboratory (LANL), where he worked in diverse fields of physics but mainly in laser-driven fusion research. After formal retirement, he continued to work at LANL part time for several years doing mathematical modeling on many diverse problems, including treating human brain tumors with beams of neutrons. His first Skeptical Inquirer article, a review article on the then-ongoing Shroud of Turin Research Project, was published exactly thirty years ago. An earlier version of this Higgs essay appeared in *NMSR Reports* (New Mexicans for Science and Reason).

FIRMNESS
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BENEVOLENCE
MORAL
HOPE
SPIRITUALITY
IMITATION
SELF-ESTEEM
CONSCIENTIOUSNESS
HUMAN NATURE
AGREEABLENESS
COMPARATIVENESS
REFLECTIVES
CAUSALITY
APROBATIVENESS
SUBLIMITY
IDEALITY
SELF-PERFECTING
MIRTHFULNESS
CONSTRUCTIVENESS
CAUTIOUSNESS
CONTINUITY
EVENTUALITY
LOCALITY
TIME
PERCEPTIVES
TUNE
INDIVIDUALITY
SIZE
WEIGHT
COLOR
ORDER
CALCULATION
LANGUAGE
DOMESTIC
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CONJUGALITY
PARENTAL LOVE
SECRETIVENESS
ACQUISITIVENESS
IMAGINAL
DESTRUCTIVENESS
COMBATIVENESS
VITATIVENESS
ALIMENTIVENESS
AMATIVENESS

PHRENOLOGY AND THE GRAND DELUSION OF EXPERIENCE

by Geoffrey Dean

In the nineteenth century, phrenology was hugely influential despite being totally invalid. Its history shows why we must be skeptical of any belief based solely on experience.

Phrenology. The science of picking the pocket through the scalp.
— Ambrose Bierce, *The Devil's Dictionary*, 1911

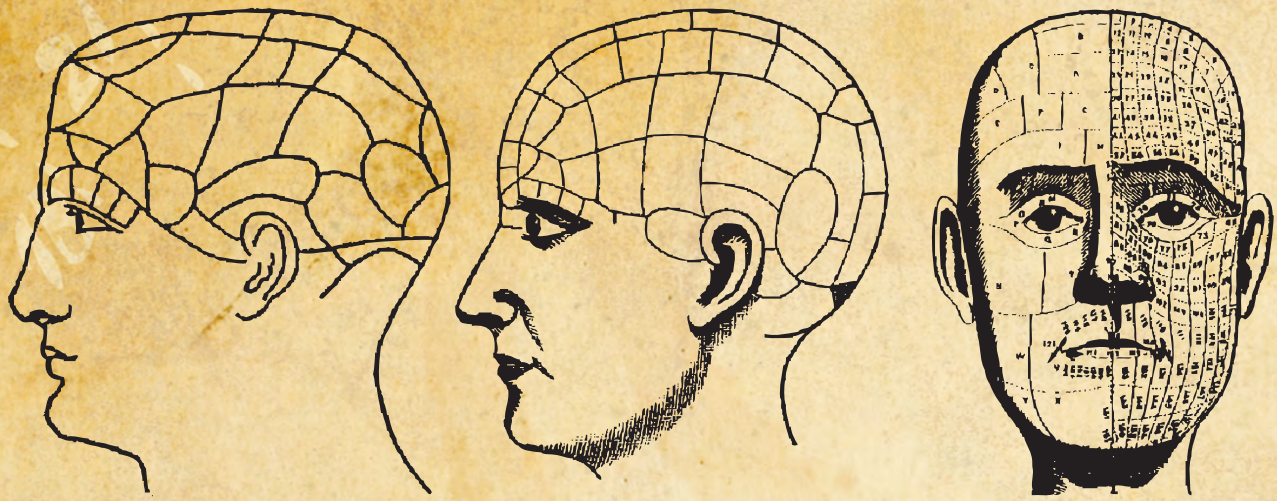
Today, phrenology ("head reading") is usually seen as the fossilized stuff of cranks and charlatans. But in the nineteenth century it had a huge influence at all levels of Western society, more than all of its later competitors (such as psychoanalysis) put together. It was influential because of its attractive philosophy and because practitioners and clients *saw* that it worked. But we now know that it could not possibly work; personal experience had led millions of people astray. Indeed, few beliefs can match phrenology for its extent of influence and certainty of invalidity. So it has valuable lessons about any experience-based belief.

PHRENOLOGY'S INFLUENCE

In the nineteenth century, phrenology affected all levels of Western life and thought. In Britain, Europe, and America, its influence was felt in anthropology, criminology, education, medicine, psychiatry, art, and literature. In France, it eroded established power and led to wide social changes. In Australia, it rationalized the violence against Aborigines and explained the criminality of convicts. For ordinary people everywhere a head reading was often required for employment or marriage.[1] But how could this happen if phrenology was totally invalid? For answers, we need to start at the beginning.

FIRST STEPS TO DELUSION

Around 1790, the German-born anatomist Franz Joseph Gall, one of the founders of modern neurology, put together his skull doctrine that later led to phrenology. He held that behavior such as painting or being careful had their own specialized organs in the brain, and that they influenced the shape of the skull. So the skull's bumps would indicate behavior and abilities that were innate. Gall spent eleven years examining hundreds of heads to test his ideas: "If . . . he observed any mechanician, musician, sculptor, draughtsman, mathematician, endowed with such or such faculty from birth, he examined their heads to see whether he might point



How to read heads. For each "brain organ" (whose number and location depends on which book you read) you guess its development (no yardsticks here) and thus its meaning (based on speculation), which you juggle (more speculation) against all the other speculative meanings and the all-important temperament based on external signs such as build and vulgarity (i.e., on even more speculation) to obtain a final assessment of character and destiny. If unsatisfactory, try again. This was phrenology's secret weapon—it was based on an experience that could never be wrong.

out a particular development of some cerebral part. . . . He also called together in his house common people, as coachmen and poor boys, and excited them to make him acquainted with their characters" (Spurzheim 1815, 271).

Gall's seemingly logical approach had two fatal defects. First, his claims were often based on a single striking case, for example "Cautiousness" was placed above the ears because an extremely cautious priest had a large bump there. Second, Gall looked only for *confirming* cases and ignored *disconfirming* cases, a flaw not lost on his critics. Thus David Skae (1847), a physician at the Royal Edinburgh Asylum, noted

WHAT WAS ONCE A MYSTERY WAS NOW WIDELY SEEN AS AN EXACT SCIENCE. IF TRUE, [PHRENOLOGY] PROMISED TO REVOLUTIONIZE JUST ABOUT EVERYTHING.

that once the truth is "fixed upon our minds," looking for confirmation is "the most perfect recipe for making a phrenologist that could well be devised." But to Gall and the thousands of phrenologists who came later, personal experience mattered more than procedural defects. Phrenology had taken its first giant step on the road to delusion.[2] Note that the delusion of experience is not limited to artifacts of reasoning such as the Barnum effect.

SPURZHEIM NAILS THE COFFIN SHUT

The next step was due to Johann Spurzheim, Gall's coworker. Gall had linked brain organs to behavior, but Spurzheim held that organs cannot relate to *behavior*, only to *traits*. Gall disagreed (the origin of traits was then a complete mystery), arguing that every person has imagination whereas not every person can paint. So in 1813, Spurzheim broke away. He renamed organs after the traits said to underlie behavior, invented organs to cover apparent gaps, and in due course adopted the name *phrenology* (a name suggested in 1815 by the naturalist Thomas Forster from the Greek words for *mind* and *discourse*). The focus was now on speculative divisions of the mind. Since behavior was now related more or less vaguely to several traits, and therefore more or less vaguely to several brain organs, everything was now open to interpretation. In one hit, Spurzheim had moved the system from a biological science to a mental philosophy; from observation to nonfalsifiability. It was the classic pseudoscientific move. Grand delusions were now inevitable.

FEEL THE BUMPS, KNOW THE MAN

In those days, the workings of the brain were largely unknown. The idea of the four humors was still popular, as was bloodletting. Traits of ability and of character were held to be equal in all men at birth and were wholly determined by upbringing. To claim otherwise was a crime against morality and God.

But phrenology *did* claim otherwise. It said traits were innate, localized in the brain, and measurable by head shape. What was once a mystery was now widely seen as an exact science. If true, it promised to revolutionize just about everything.

But it was not true. Phrenology was partly right about brain functions being localized but wrong about the actual functions. Not slightly wrong; totally wrong. The brain involves *processes* such as moving, touching, hearing, and seeing, not phrenological *traits* such as neatness, curiosity, love of children, attachment to home, and relish for food.[3] As shown by modern imaging techniques, some of these processes are localized in distinct regions, while others are distributed and interactive. But all are sufficiently diversified that brain damage or cell loss may have no noticeable effect. The same techniques have shown that the claimed phrenological organs do not exist.

Nor is brain size a measure of power to the extent claimed by phrenologists. So we can look at phrenology knowing that a certain head shape cannot possibly mean what it is supposed to mean. Few beliefs about man can match phrenology for such certainty of invalidity.[4]

Unsurprisingly, phrenology copped unceasing parody. A modern example appeared in the U.K.'s *Independent Long Weekend* of January 11, 1997, suggesting how "to improve people's personalities by rearranging their head bumps. With a mallet. Do not try this at home" (p. 2).

INFLUENCE REVISITED

What attracted millions of converts and made phrenology historically important was the appeal of its philosophy. By offering a recipe for living and self-improvement based not on metaphysics but on claims testable by experience, phrenology was a dream come true. And in the 1810s it took off like a rocket; first in Europe, then Britain, then America.

The average life expectancy in Britain (adjusted for high infant mortality) at that time was forty years, a quarter of the population was illiterate, few homes had running water or even a clock, and a phrenology book cost a quarter of the average weekly wage. Yet in less than twenty years about thirty phrenological societies were formed, and roughly one person in 3,000 was "moderately well instructed in phrenology, [more] than there are of persons equally advanced in geology, entomology, botany, astronomy, or similar sciences" (Watson 1836, 223).

But by implying that man rather than God was in charge, phrenology created an unceasing storm of religious and moral protest. Critics said it reduced the soul to anatomy and gave too much power to ordinary people. Nevertheless, it attracted people of intelligence and a vast responsive literature wherein every criticism was furiously attacked.[5]

When critics said (in tracts of paralyzing wordiness) "there is no evidence favoring phrenology but much favoring Christianity, so we prefer the latter," the reply was "if there is no God, what is the organ of Veneration for?" When critics said "phrenology is without intellectual challenge and suits only the coarsest taste," the reply was "it is so simple and natural that ordinary people can put it to immediate use."

Soon there was a runaway demand for character readings, and by the 1840s phrenology had divided into two camps: one a fortune-telling scam where a travelling phrenologist could earn more in a week than in a whole year of farm laboring; the other a serious study whose journals were filled with alarms against the impostors. (The later parallel with newspaper astrology is unmistakable here.) Both camps promoted phrenology as a matter not of belief but of demonstration. Test-it-and-see was an essential part of the message. So how could an actually invalid phrenology survive such a process? First, a look at replies to stock objections.

STOCK OBJECTIONS

Phrenologists felt they had convincing replies to every stock objection: The skull varies in thickness. *Not enough to matter.* Everything relates to size not quality. *Experience shows that phrenology works.* Stomachs digest different foods, so why can't brain organs do different things? *Stomachs may be versatile but their function is the same.* Parts of the brain can be destroyed without apparent

Pioneers of phrenology. From left: Franz Joseph Gall (1758–1828), Johann Spurzheim (1776–1832), George Combe (1788–1858), Orson Fowler (1809–1887), Lorenzo Fowler (1811–1896). Pictures are from Severn (1929, 244, 256, 257) and Davies (1955, 48, 49).

effect, so how can traits be localized? *The investigators were ignorant of phrenology and missed the relevant behavior.*

But other objections were ignored. Organs could be in layers (so head shape could be meaningless?), the same organ appears on both sides of the head (so we believe with one and disbelieve with the other?), important traits such as sympathy and love of truth are missing, and worst of all *any* head can be made to fit *any* behavior so nobody could know if phrenology was wrong. For example, a small Combativeness could still be combative due to a large Firmness, a large Destructiveness, or a large Approbation (fights to gain admiration). Spurzheim's nonfalsifiability was working well. But phrenologists were not interested. Why worry when there were testimonials?

TESTIMONIALS

Critics of New Age beliefs "typically encounter anecdotes and testimonials where there ought to be rigorous pre- and post-treatment comparisons" (Beyerstein 1990, 33). Phrenology provides a definitive test of testimonials because it had lots of them, even from the very top:

"I never knew I had an inventive talent until phrenology told me. I was a stranger to myself until then" (Thomas Edison). "The phrenologist has shown that he is able to read character like an open book . . . with an accuracy that the most intimate friends cannot approach" (Alfred Russel Wallace, cofounder of the theory of evolution). "I declare that the phrenological system of mental philosophy is as much better than all other systems as the electric light is better than the tallow dip" (William Gladstone, four times prime minister of England). All are from Severn (1913, 6).

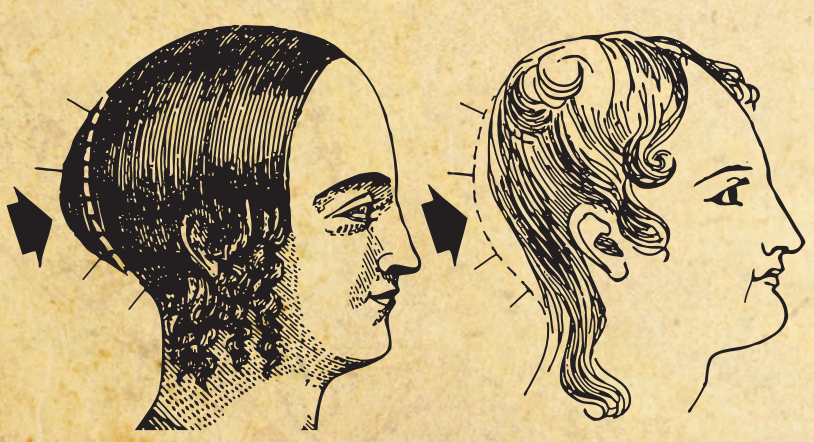
There were also countless testimonials from ordinary people. "Scarcely a day passes that the editor of the *Phrenological Journal* does not receive some outburst of thankfulness from a grateful recipient of needed counsel" (Sizer and Drayton 1899). "35,000 testimonials" said a sign in the window of a London phrenologist (see picture in Parker and Parker 1988, 34). How could 35,000 clients be wrong, to say nothing of Edison, Wallace, and Gladstone? The answer boils down to experience. And wishful thinking.

In 1929, the British Phrenological Society published thirty testimonials entitled *The Revival of Phrenology: The Phrenological Principles and Localisations Confirmed by Modern Scientists*. None mentioned the results of actual tests, yet they supposedly showed that "the main principles of phrenology can no longer be disputed."

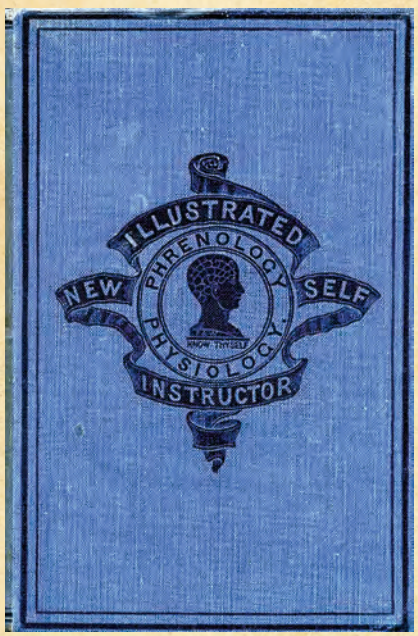
PLAINLY DEMONSTRATED

Yes, phrenology seemed to work. It was the apparent accuracy of readings that was so convincing to practitioners and clients. It was "so plainly demonstrated that the non-acceptance of Phrenology is next to impossible" (British Phrenological Association 1896, 64).

For example, Severn (1929, 84) cites a reading of himself, made when he was twenty-five, that "was a remarkably true description . . . probably the best I have ever had." Here are some excerpts: "Great firmness and reality of purpose. The mind is sensitive and active. The judgement is keen, and log-



Two heads typical of those in the above *New Illustrated Self-Instructor*. Arrowed is Parental Love large (left) and small (right), with spikes and dashed lines added by me to indicate Fowler's organ boundaries and average contour. The largeness or smallness extends beyond the boundaries on either side, which is contrary to the independence required by phrenology.



1895 edition of Lorenzo Fowler's *New Illustrated Self-Instructor in Phrenology and Physiology*. It cost two shillings post free (then about one-fifteenth of the average weekly wage) and had 182 pages with over one hundred engravings of heads showing large and small organs. You felt your head, ticked fifty-one boxes on a seven-point scale, and looked up the details, some worthy of today's newspaper horoscopes as in "Expect next to nothing, and undertake less" (p.122). Including other editions, sales reached 100,000 in the United Kingdom and 150,000 in the United States.

ical in its conclusions. He is not very original, but may be in his habits. Fond of reform and improvements of all kinds [note the contradiction]. He loves truth, and will have it at any price. The mind is sceptical and too honest to believe without reasonable evidence. A lover of moral and personal liberty. Is warm-hearted." More on this later.

The phrenologist Stackpool O'Dell (1925, 12) explains how "in his daily experience, when he says that a child has unusual talent for drawing, he finds that it is so, or when he says of another that he has exceptional musical capacity, it proves correct. . . . He judges these points by the shape of the head, and a due consideration of temperament. And . . . his conclusions, in most instances, will be recognised as strikingly correct."

GEORGE COMBE

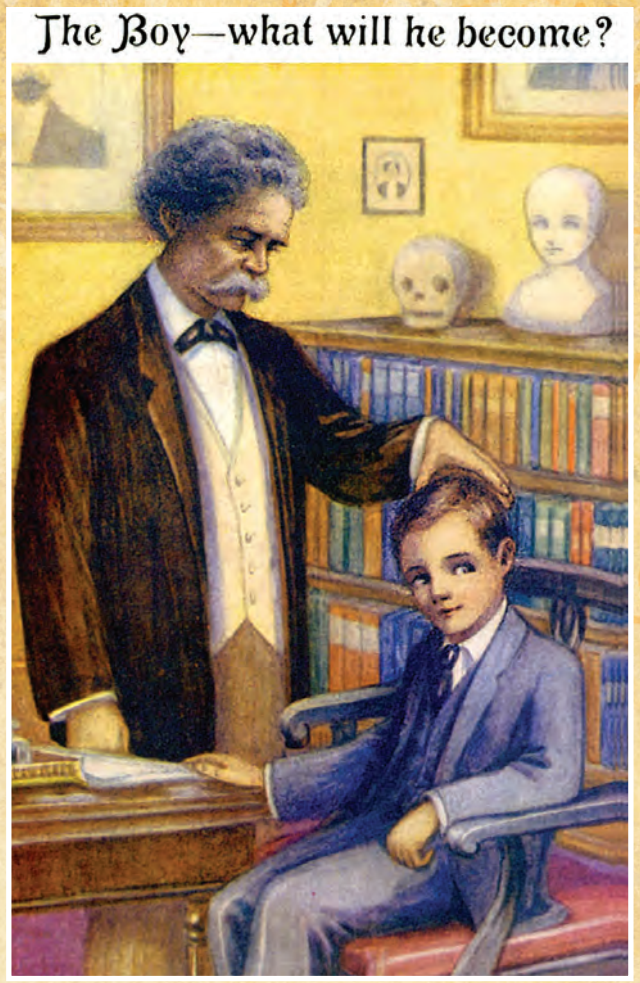
The experience of George Combe, the most famous British practitioner of his time, seems even more convincing. In 1829, he visited a Dublin asylum to demonstrate phrenology to its doctors who, when his readings of selected inmates were over, compared them with their own diagnoses. For a male aged thirty-seven Combe found "predisposed to melancholy" versus the diagnosis "melancholy, great timidity of disposition." For a female aged forty-eight Combe found "self-esteem is predominant" versus "monomania, pride." There were sixteen hits as good as these, two nearly as good, one miss, and four passes with "no grounds for inference." In general, the outcome was "completely in harmony with what was anticipated." Combe's many visits to prisons and other asylums were just as successful (Williams 1894).

In short, people saw how phrenology seemed to work and were convinced. Experience was the only game in town. But how could people be convinced if phrenology was totally invalid?

ENCOURAGING DELUSION

The problem in the above cases is that there are no controls to guard against delusion. In Severn's case, the reading is either very general (so anyone would agree with it) or is guessable from personal contact. In O'Dell's case, we cannot tell if his hits are genuine or are due to circumstances, including not wanting to be seen disagreeing with a renowned phrenologist.

This is similarly true in Combe's case, which allowed cueing by the subject's appearance and by sensing the attitudes of those present. Given a timid, fearful subject, or a proud disdainful one, together with reciting aloud the often opposing indications, and no doubt a practiced skill in reading human nature and onlookers, Combe could hardly go wrong. Indeed, he almost never mentions unobservable phenomena such as abilities, preferring things like melancholy (a term then applied to any personal distress) and propensity to thieving, both consistent with a dependence on cues. If this failed, the result could always be explained by an opposing organ, by upbringing, or by declaring that criticism comes from men and not Nature—and only Nature had the authority to say whether phrenology was true or not.



Frontispiece to a seventy-two-page booklet provided with each reading by J. Millott Severn, the last major British phrenologist, c. 1920. The booklet included interpretations on a seven-point scale for each of forty-nine brain organs. For five shillings (then about one-eighth of the average weekly wage) Severn (pictured) would tick the ones applying to you.

Alternatively, failures could simply be ignored, as when Severn (1929, 83) visited O'Dell and asked if he could be a phrenologist. "He examined my head and pointed out so many mental faculties detrimental to my acquiring proficiency that I gave up further thought of qualifying professionally." Yet he became a top British phrenologist! Notice how easily the obviously wrong reading was ignored.

RARE U-TURNS

To their credit, not every believer remained a believer. American psychologist Herbert Spencer (1820–1903) practiced phrenology and invented a device to improve the measurement of cranial features, but he later abandoned phrenology as unscientific.

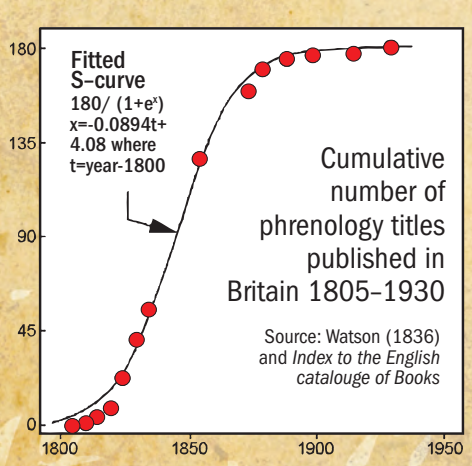
The British botanist Hewett Watson, author of the 1836 survey *Statistics of Phrenology*, was convinced of phrenology's validity. But after three years as editor of the *Phrenological Jour-*

nal, which "obliged him to make more close scrutiny into various points," he saw that much "is doubtful, if not erroneous." Given a choice between upsetting believers and promoting nonsense, he preferred to resign (Watson 1840).

UNCOVERING DELUSION

The following study, the only one of its kind that I could find, shows how a simple control uncovers the delusion. A female patient aged twenty-two of Morgenthaler (1930), a Swiss psychiatrist, was amazed at the penetrating accuracy of her phrenological reading. It had twenty-six statements such as: "You are a blend of natural feelings and much stronger emotions. You are a definite female, which explains your weaknesses. You are not sharply focused. Critical judgments give way to warm-hearted feelings." So Morgenthaler asked ten female subjects to judge how well each statement applied to them. An average of 70 percent said the statements were definitely or probably correct, 13 percent were uncertain, and 17 percent said they were definitely or probably wrong. It was the classic Barnum approach to instant delusion. The subjects knew the reading was not theirs; otherwise their acceptance might have been even higher.

WHEN THE HUMORIST MARK TWAIN VISITED LORENZO FOWLER (UNDER A FICTITIOUS NAME) HE WAS TOLD HE HAD NO SENSE OF HUMOR, BUT ON A REPEAT VISIT UNDER HIS OWN NAME HE HAD "THE LOFTIEST BUMP OF HUMOR" EVER ENCOUNTERED.



The cumulative growth of populations over their lifetime, whether of cathedrals or phrenology books, traces an S-curve that shows when the end is near. For phrenology this was around 1900. In the 1960s, historians became aware of phrenology's importance in nineteenth-century life, and historical studies duly increased. Of course some people said phrenology would last forever. Thus in his 1898 book *The Wonderful Century*, Alfred Russel Wallace held that "in the coming century phrenology will assuredly attain general acceptance" (p.192). It was all part of the delusion inspired by experience.

BIRD BRAINS TELL ALL

In the 1840s, the eminent French physiologist Pierre Flourens introduced the experimental approach that phrenologists had steadfastly rejected. He found that the intellect in pigeons and chickens gradually weakened as the brain was cut away, but still remained even when very little brain was left, which effectively demolished the claims of phrenology. A similar point had been made earlier by the American anatomy professor Thomas Sewall. So the need to test actual people disappeared, ironically just at the time when the rise of experimental psychology would have made such tests possible. But enough tests were made to confirm the expected negative results.

EXPERIMENTAL TESTS

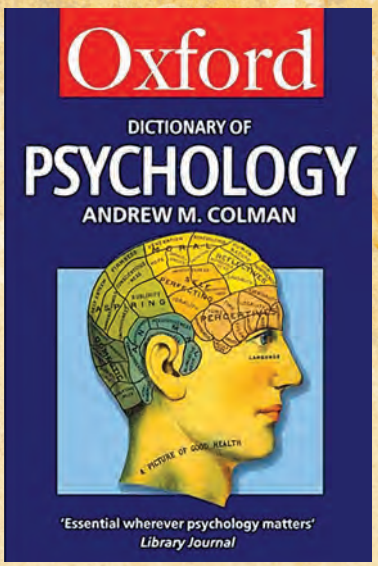
Some tests were obvious. When a phrenologist was given the supposed head cast of an eminent professor (it was actually the cast of a large turnip), the reading emphasized wisdom and intelligence (U.K.'s *Times* newspaper, February 2, 1824). When the humorist Mark Twain visited Lorenzo Fowler (under a fictitious name) he was told he had no sense of humor, but on a repeat visit under his own name he had "the loftiest bump of humor" ever encountered (Twain 1959; Lopez 2002).

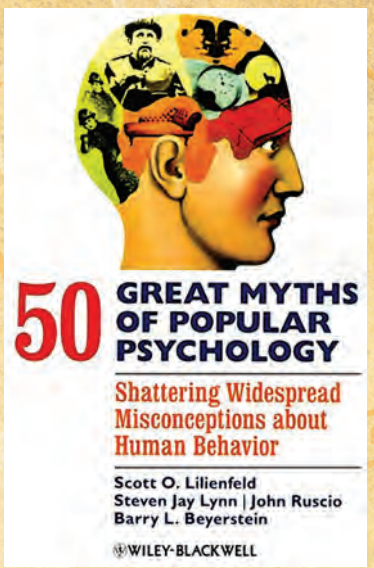
Skae (1847), mentioned earlier, made a test that today would seem just as obvious. He went to the Phrenological Society's collection of head casts, picked ten famous cases "whose character was well known," measured the elevation of each organ by calipers, and corrected it by the cube root of head size shown by immersion in water. "I assumed that the measurements of the crania thus calculated would correspond with the known characters of the individuals, if phrenology was true." But the results were "generally speaking at variance with phrenology, and in many instances so utterly irreconcilable with its truth, as to appear altogether subversive of it." The ten casts had not shown the bumps that phrenology said they should.

The response by phrenologists to Skae's results was polemic, lengthy, and largely irrelevant. To them, the principles of phrenology were absolute; therefore, negative results were sure proof of incompetence. They said the correction for head size was inappropriate, and that the phrenologist's eye and hand were sensitive to nuances missed by calipers.[6] Skae then challenged them to get positive results from his data but they declined, arguing that the unsoundness of his measurements "entirely vitiates every conclusion to which they have been supposed to lead."[7]

Nearly eighty years later, Cleeton and Knight (1924) read physiognomy and phrenology books to find out what

each cranial feature meant, but they found "great disagreement." So they selected ten traits such as IQ, sociability, and willpower for which the disagreement was least. They then recruited twenty-eight adults, measured their cranial features, and had their traits rated by twenty close associates who knew all twenty-eight subjects. The results showed no link between cranial features and traits. Of 201 correlations, four were significant ($p = 0.04$) versus six expected by chance. The mean correlation was a negligible 0.004.




50 GREAT MYTHS OF POPULAR PSYCHOLOGY
Shattering Widespread Misconceptions about Human Behavior
Scott O. Lilienfeld
Steven Jay Lynn | John Ruscio
Barry L. Beyerstein
WILEY-BLACKWELL

Phrenology heads still provide an appealing and appropriate image for the covers of modern psychology books, here in 2001 and 2010.

SLOW TO DIE

The above tests confirmed that phrenology cannot deliver benefits beyond those due to non-phrenological factors. But phrenology was slow to die. In the 1950s, phrenologists still existed in Britain and in the larger American cities (Dallenbach 1955). Today there is at least one pro-phrenology website, so supporters are not yet extinct.[8] But in practice, phrenology "lasted only long enough to become one of the most thoroughly discredited theories in the history of physiological psychology" (Uttal 2001, 102). It "was the most popular of all the doctrines of psychology in the whole history of the science, and at the same time the most erroneous. It affords a striking example of the danger of erecting a vast superstructure on inadequate observation and inexact methods" (Flugel 1964, 36–37). "Eventually phrenology lost out to science and to public indignation, and degenerated into a sect of zealous extremists unable to pass on discredited knowledge to a new more enlightened generation" (Van Wyhe 2002).

NEGLECT OF SCIENTIFIC CAUTION

It is easy to see why the scientifically invalid phrenology could have been so popular. To millions of people it was so fashionable and so satisfying, and its invalidity was so invisible, that it could not fail to work. Their experience of phrenology could not fail to be convincing. But it was a delusion. And all due to a neglect of scientific caution.[9,10]

We might hope that such neglect is less likely today. But the literature of any experience-based belief shows it to be raging out of control on every page. As with phrenology, believers refuse to accept that experience is unreliable; they brush aside contrary evidence and dismiss critics as bigoted and closed-minded. They don't want to know. Neglect of scientific caution is much more fun.

For believers, the lesson is that experience means nothing without controlled tests. In the *Encyclopedia Britannica*, phrenology now occupies one paragraph whereas it once occupied many pages.

For skeptics, the lesson is that the delusion of experience should never be underestimated. It dies only when believers die. Reformers should forget the present generation and target the next.[11]

NOTES

1. The historical importance of phrenology was not widely documented until after the 1960s, when science historians became sensitive to social considerations. Today it has been minutely examined in scholarly books, articles, at least twenty PhD theses, and various websites, of which easily the most comprehensive is John van Wyhe's www.historyofphrenology.org.uk/. But these sources are invariably concerned with social issues and not the role of experience in the acceptance of phrenology. Indeed, the literature of phrenology is so clogged with side issues (of philosophy, of politics, of religion, of morality, of society in general), so often tedious to read (wordiness being the style of the day), and so hard to find (notwithstanding the many early publications now available online via the above website), that the role of experience has been largely unexamined. The source material for this article includes books and journals previously in the library of the British Phrenological Society and now held by the University of London.

2. Jerison (1977) argues that Gall went wrong in the same way that others went right. Gall happened to pick the wrong hypothesis and spent the rest of his life trying to prove it. Ironically, Gall failed not because he was reductionist but because he was not reductionist enough. Had he reduced brain organs to simple things like toe-twitches and thumb-tingles, he would have found success because only such simple functions are localizable in the brain.

3. The record for odd traits, albeit in physiognomy rather than phrenology, must go to Joseph Simms who, in a 600-page book running to at least ten editions by 1891, proposed Aquasorbitiveness (love of water), Mnemoniconominality (ability to remember names, presumably the author had it), Morivalorosity (moral courage), Philomonotopicalness (love of one particular place), Temporinaturalitiveness (appreciation of time passing), and many others.

4. We have a certainty here well beyond that presently possible in, say, psychoanalysis. But we should not go overboard. Phrenology for all its faults led to the discovery that brain and mind were associated and that localization existed. Along the way it established *function* as a psychological term, popularized the expression of traits on scales such as one to five, and confirmed the futility of purely metaphysical speculations about the nature of man. Which is why phrenology appears in every history of psychology, unlike unproductive beliefs such as astrology.

5. During 1801–1889, *The Index to the English Catalogue of Books* recorded a total of eighty-five phrenology titles versus sixteen astrology, fifteen physiognomy, and six palmistry (graphology did not appear until the 1870s in France). In 1928, after forty years of searching through libraries in America, Britain, France, and Germany, the phrenologist John Melville estimated that about 4,000 books and pamphlets had been published on phrenology (Severn 1929, 438, 442). Best sellers included George Combe's *Constitution of Man* (500,000 in sixty years), Fowler's *Phrenological Self-Instructor* (250,000), and Sizer and Drayton's *Heads and Faces* (150,000). For comparison, works by popular novelists such as Dickens typically sold 50,000 copies. Today the British Library has about 300 phrenology books and pamphlets, the New York Public Library about 400.

6. That the supposed sensitivity of the phrenologist's eye and hand led to delusion is shown by phrenology's golden rule, namely size = power. Other things being equal, the bigger the head the better. What could be more reasonable? Thus Severn (1913, 20), who in thirty years as a practicing phrenologist had examined more than 100,000 heads, or roughly fifteen each working day, says, "Persons of commanding mentality invariably have heads above the average size." But ten scientific studies of IQ versus head size involving a total of more than 11,000 adults found a mean correlation of only 0.13 (based on data in Wickett et al. 1994), which is too small to be observable by phrenologists—indeed their observations should have denied it. So their claim was a case of believing is seeing. Nevertheless their claim was not entirely wrong, for the correlation between IQ and actual *brain* size (as opposed to *head* size) measured by magnetic resonance imaging is about 0.4 (Rushton 1997).

7. Phrenology had one disadvantage seldom admitted by phrenologists, especially in their response to critics, because "In numberless instances, [plaster] casts form our only source of phrenological observation" (Hytche 1844). Most enthusiasts had a collection, in rare cases exceeding one or two thousand casts. But applying plaster of Paris to a thickly lathered and oiled head was quite unpleasant for the subject. The setting plaster prevented free respiration and generated much heat, whereupon some subjects "become so nervous, that the features are distorted, and . . . the very character of the head becomes changed." Due to bunched-up hair, or to expansion of the setting plaster, "the cast is always larger than the head [in diameter by an inch or more] . . . when we consider the additional energy conferred by every extra inch of healthy brain, we shall perceive how different will be our estimate of cerebral power." So when using casts, "in ninety-nine cases out of a hundred our judgement is likely to be incorrect" (Hytche 1844).

8. The largest (and very user-friendly) pro-phrenology website is www.phrenology.org operated out of Belgium. It proclaims "Phrenology is a true science. . . . Today, much of the criticism against Phrenology can be easily dismissed. Extensive experimental verification of the Phrenological localisations have proved their practical value." No experimental verifications are cited. Nearly 700 images, mostly of heads, can be found by Googling *phrenology > images*.

9. Whether the price paid for such neglect is worth whatever satisfaction it brings, including keeping people off the streets, is a topic that skeptics might like to ponder. The problem of course is that a belief may be a crutch, but hearts are not won by kicking away crutches.

10. The satisfaction brought to clients by a warm and sympathetic phrenologist should be self-evident. The satisfaction brought to *phrenologists* may be less evident but is beautifully expressed by Severn (1929, 504): "It is a great career, and a splendid and glorious mission to be a phrenologist. There is life and vitality in the work, and though it may not yield big financial gains, in a thousand ways it will amply repay such as are adapted to the calling, and are desirous of doing great good in the world, and of being of immense service to their fellow creatures. I have frequently said that notwithstanding all the adverse circumstances I have experienced, if I had a hundred lives, I would devote them all absolutely and wholly to phrenology."

11. Among the exhibits at the Minneapolis Museum of Questionable Medical Devices are machines with a headpiece of thirty-two mechanical probes, each with five contact points to measure size on a five-point scale. In ninety seconds it will print out for each of thirty-two phrenological organs a brief reading with moral overtones. "Secretiveness – Average – You are fairly secretive but can improve. You tell things to your friends. Don't do it." The readings are popular (fifty a day) and are billed as entertainment, but many people see them as accurate and are unwilling to accept that phrenology is invalid. The delusion of experience is alive and well. From McCoy (1985; 1996).

REFERENCES

Beyerstein, B.L. 1990. Brainscams: Neuromythologies of the new age. *International Journal of Mental Health* 19(3): 27–36.

British Phrenological Association. 1896. *The British Phrenological Year Book 1896*. London: British Phrenological Association. There were then 123 practicing phrenologists in the United Kingdom. In 1967, after eighty years of existence, the Association went into voluntary liquidation.

Cleeton, G.U., and F.B. Knight. 1924. Validity of character judgements based on external criteria. *Journal of Applied Psychology* 8: 215–231.

Dallenbach, K.M. 1955. Phrenology versus psychoanalysis. *American Journal of Psychology* 68: 511–525.

Davies, J.D. 1955. *Phrenology Fad and Science: A 19th-Century American Crusade.* New Haven, CT: Yale University Press.

Flugel, J.C. 1964. *A Hundred Years of Psychology*. 3rd edition. London: Duckworth.

Fowler, L.N. 1895. *Fowler's New Illustrated Self-Instructor in Phrenology and Physiology.* 20th edition. London: Fowler.

Hytche, E.J. 1844. A glance at the imperfections of phrenological casts. *Phrenological Journal* 17: 246–253.

Jerison, H.J. 1977. Should phrenology be rediscovered? *Current Anthropology* 18: 744–746. Title refers to accepting the place of phrenology in the history of anthropology.

Lopez, D.J. 2002. Snaring the Fowler: Mark Twain debunks phrenology. SKEPTICAL INQUIRER 26(1): 33–36

McCoy, R.W. 1985. Phrenology and popular gullibility. SKEPTICAL INQUIRER 9(3): 261–268.

———. 1996. Phrenology. In G. Stein (ed.), *The Encyclopedia of the Paranormal*. Amherst, NY: Prometheus Books.

Morgenthaler, W. 1930. Über populäre Charakterdiagnostik. *Schweizerische Medizinische Wochenschrift* 39: 912–914.

O'Dell, S.E. 1925. *Phrenology: Essays and Studies*. 2nd edition. London: London Phrenological Institution.

Parker, D., and J. Parker. 1988. *The Future Now: How to Use Prediction in Your Life*. London: Mitchell Beazley.

Rushton, J.P. 1997. Race, intelligence, and the brain: The errors and omissions of the revised edition of S.J.Gould's *The Mismeasure of Man* (1996). *Personality and Individual Differences* 23: 169–180.

Severn, J.M. 1913. *Popular Phrenology*. London: Rider.

———. 1929. *Life Story and Experiences of a Phrenologist*. Brighton: Severn. An endearing account of forty years of experience including how he married his wife on the basis of phrenology two months after meeting her, since when "we have neither of us had the slightest reason to regret the step we had seemingly so hastily taken" (p. 157).

Sizer, N., and H.S. Drayton. 1899. *Heads and Faces and How to Study Them: A Manual of Phrenology and Physiognomy for the People*. New York: Fowler and Wells.

Skae, D. 1847. Letter. *Phrenological Journal* 20: 273–283. Responses by phrenologists appear on pp. 43–48 and 283–290.

Spurzheim, J.G. 1815. *The Physiognomical System of Drs Gall and Spurzheim Founded on an Anatomical and Physiological Examination of the Nervous System in General and the Brain in Particular and Indicating the Dispositions and Manifestations of the Mind*. London: Baldwin, Cradock and Joy.

Twain, M. 1959. *Autobiography of Mark Twain Including Chapters Now Published for the First Time.* New York: Harper & Brothers.

Uttal, W.R. 2001. *The New Phrenology: The Limits of Localizing Cognitive Processes in the Brain.* Cambridge, MA: MIT Press.

Van Wyhe, J. 2002. The History of Phrenology. Online at www.historyofphrenology.org.uk/.

Watson, H.C. 1836. *Statistics of Phrenology, Being a Sketch of the Progress and Present State of that Science in the British Isles*. London: Longmans.

———. 1840. Editorial. *Phrenological Journal* 13: 386–387.

Wickett, J.C., P.A. Vernon, and D.H. Lee. 1994. In vivo brain size, head perimeter, and intelligence in a sample of healthy adult females. *Personality and Individual Differences* 16: 831–838.

Williams, W.M. 1894. *A Vindication of Phrenology*. London: Chatto & Windus.

Geoffrey Dean, PhD, is a British technical editor living in Perth, Western Australia. He once had his head read but was too young to recall details. He is a fellow of the Committee for Skeptical Inquiry and a contributor to four Prometheus Books, including *Skeptical Odysseys*. He and his associates are best known for critical studies into astrology since the 1970s and the skeptical website www.astrology-and-science.com.

Homeopathy: A Critique of Current Clinical Research

An evaluation of the clinical research by the group that has published most of the papers in homeopathy, 2005–2010, finds numerous flaws in the design, conduct, and reporting along with a tendency to overinterpret weak data.

EDZARD ERNST

Homeopathy has remained one of the most controversial medical treatments in the world. It is based on the "like cures like" principle and the idea that serial dilution of a substance renders it not less but more potent. Both of these axioms of homeopathy lack biological plausibility (Sehon and Stanley 2010). Nevertheless, homeopathy was recently cited as one of "the most popular and widely used forms of medicine in the world" (Chatfield 2011).

Advocates of homeopathy argue that homeopathy's "clinical effectiveness cannot be disputed" (Chatfield 2011). To prove their point, they produce evidence that seems to confirm this assumption (Fisher 2011). Critics tend to counter that these data are seriously flawed—so much so that they cannot be relied upon (Bewley et al. 2011).

The aim of this article is to critically evaluate the clinical research of the research group that, in recent years, has published most of the clinical research in homeopathy.

Methods

Medline searches were conducted to identify the team that, in the period between 2005 and 2010, had published more original, clinical research in homeopathy than any other group worldwide. Subsequently, all their publications were obtained and read in full. Data were extracted according to pre-defined criteria (Table 1). Each article was then critically evaluated.

Results

The most prolific research group in this area was identified to be from Berlin. Within the last five years, this team published a total of eleven clinical studies (Brinkhaus et al. 2006; Keil et al. 2008; Teut et al. 2010; Witt et al. 2005a; Witt et al. 2009a; Witt et al. 2005b; Witt et al. 2008; Witt et al. 2009c; Witt et al. 2009b; Witt et al. 2010; Witt et al. 2011) (Table 1). The articles refer to randomized clinical trials and cohort studies published in both conventional (n = 7) and alternative medical journals (n = 4). Most of the articles have major limitations, which will be discussed below.

Discussion

Homeopathy is not an area of buoyant research activity; the fact that one center published eleven clinical studies of homeopathy within five years is remarkable. The eleven publications fall in three categories: randomized clinical trials (RCTs); cohort studies without controls; cohort studies with controls. These will be discussed in turn.

Three RCTs of homeopathic arnica were published in one single article (Brinkhaus et al. 2006). They all included patients undergoing arthroscopic knee surgery and all used change in knee circumference after surgery as the primary outcome measure. The first study included 227 patients with arthroscopy, the second thirty-five patients with artificial knee joint implants, and the third fifty-seven patients with cruciate ligament reconstructions. No power calculations were provided. The first two RCTs showed no significant effect of peri-operative homeopathic arnica D30 compared to placebo. The third RCT did demonstrate a significant reduction of 1.8 percent. The authors also mention a post-hoc pooled analysis of all three RCTs that revealed a borderline significant effect ($p = 0.04$). They conclude that "patients receiving arnica showed a trend toward less post-operative swelling compared to patients receiving placebo" (Brinkhaus et al. 2006) and recommend that the observed effects "seem to justify the use of homeopathic arnica in cruciate ligament reconstruction" (Brinkhaus et al. 2006). The authors did not critically discuss the clinically irrelevant reduction in knee circumference. The stated aims include investigating the safety of homeopathic arnica, yet the sample size is far too small for identifying rare adverse effects. No conflicts of interest were mentioned in the article (Brinkhaus et al. 2006).

This cohort study was submitted to a multitude of analyses that (so far) have been published in a total of seven articles (Teut et al. 2010; Witt et al. 2005b; Witt et al. 2008; Witt et al. 2009c; Witt et al. 2009b; Witt et al. 2010; Witt et al. 2011). The first two of them refer to the results at year two (Witt et al. 2005b), the third at year eight (Witt et al. 2008). The stated aims of the two- and eight-year follow up are, however, remarkably different

Key data from all included investigations

First author (year) [ref]	Condition	Study design	Study aim (quote)	Sample size	Journal type	Conclusion (quote)	Conflicts of interest (funding)
Brinkhaus et al. (2006)	3 different types of knee surgery	3 p.c. d.b. RCTs	"…to investigate the effectiveness and safety of homeopathic arnica…"	1) 227 2) 35 3) 57	Alt. Med.	"…patients receiving homeopathic arnica showed a trend towards less postoperative swelling…"	n.m. (n.m.)
Witt et al. (2005b)	Any	Prospective, multicentre cohort study	"to determine the spectrum of diagnoses and treatments as well as the course of disease over time among patients who chose to receive homeopathic treatment"	3981	Conv. Med.	"…homeopathic medical therapy may play a beneficial role in the long-term care of patients with chronic diseases."	n.m. (Carstens Foundation)
Witt et al. (2008)	Any	Prospective, multicentre cohort study	"…to evaluate health status changes under homeopathic treatment in routine care"	3709	Conv. Med.	"Patients who seek homeopathic treatment are likely to improve considerably"	n.d. (Carstens Foundation)
Witt et al. (2009c)	Atopic eczema	Prospective, multicentre cohort study	"…present the subgroup of children with atopic eczema followed up for 24 months"	225	Conv. Med.	None	n.m. (Carstens Foundation)
Witt et al. (2011)	Psoriasis	Prospective, multicentre cohort study	"To evaluate details and effects of homeopathic treatment in patients with psoriasis in usual medical care"	82	Conv. Med.	"Under classical treatment, patients with psoriasis improved in symptoms and QoL."	n.m. (Carstens Foundation)
Witt et al. (2009b)	Dysmenorrhea	Prospective, multicentre cohort study	"Evaluating homeopathic treatment for dysmenorrhea"	128	Conv. Med.	"Patients with dysmenorrhea improved under homeopathic treatment"	n.d. (Carstens Foundation)
Teut et al. (2010)	Any condition of elderly patients	Prospective, multicentre cohort study	"…to determine the spectrum of diagnoses and treatments, as well as to describe the course of illness among older patients who chose to receive homeopathic treatment"	83	Conv. Med.	"The severity of disease showed marked and sustained improvements under homeopathic treatment"	n.d. (Carstens Foundation)
Witt et al. (2010)	Migraine	Prospective, multicentre cohort study	"…to evaluate details and possible effects of an individualized homeopathic treatment in patients with migraine in usual care"	212	Alt. Med.	"…patients seeking homeopathic treatment for migraine showed relevant improvements that persisted for the observed 24 months"	n.d. (Carstens Foundation)
Witt et al. (2005a)	5 selected chronic disorders: •Headache •Low back pain •Depression •Insomnia •Sinusitis	Comparative cohort study	"To evaluate the effectiveness of homeopathy versus conventional treatments in routine care"	493	Alt. Med.	"Patients seeking homeopathic treatment had a better outcome overall compared with patients on conventional treatment, whereas total costs in both groups were similar"	n.m. (n.m.)
Keil et al. (2008)	Children with eczema	Comparative cohort study	"To assess… whether homeopathic treatments could influence eczema sign/symptoms and quality of life compared with conventional treatment"	118	Alt. Med.	"…both therapy groups improved similarly regarding perception of eczema symptoms… and disease related quality of life"	n.m. (Innungskrankenkasse, Hamburg)
Witt et al. (2009a)	Children with eczema	Comparative cohort study	"To examine the effectiveness, safety and costs of homeopathic versus conventional treatment in usual care."	135	Conv. Med.	"… homeopathic treatment was not superior to conventional treatment…"	n.m. (Robert Bosch Foundation)

p.c. = placebo controlled; Alt. Med.= alternative medicine; Conv. Med.= conventional medicine; d.b. = double-blind; sig = significant; n.m.= not mentioned; n.d. = not declared

(Table 1). The authors recruited 103 primary care practices in Germany and Switzerland employing homeopathy. All patients consulting the homeopathic physician for the first time were included regardless of diagnosis. About 68 percent of the patients "believed" in homeopathy. The main outcome measures were patients' and physicians' assessment of complaints. The questionnaire used for children had been validated, but the other outcome measures had been developed by the researchers themselves and had not been formally validated. All patients underwent an initial consultation by their homeopathic doctor lasting two hours on average.

Despite the multiple publications, only scant details were provided in the articles about the actual treatments administered. In one article, "recording all treatments" was mentioned in the methods section, but the results did not provide these details (Witt et al. 2011). Half of the patients also consulted non-study physicians who were not necessarily homeopaths (Witt et al. 2005b). In the article reporting the eight-year follow-up (Witt et al. 2008), the authors state that "all physicians were completely free to choose a treatment"; presumably this included conventional therapies as well.

Despite the fact that patients had been recruited regardless of their medical condition, the conclusions of one of the articles refer to "patients with chronic diseases" (Witt et al. 2005b). The authors stress repeatedly that cause and effect cannot be inferred in a study of this nature. Yet, they repeatedly imply causal inferences, for example: "younger patients and those with more severe disease appear to benefit most from homeopathic treatment" (Witt et al. 2005b); "the effect must not be attributed to homeopathic treatment alone" (Witt et al. 2008) (implying that at least part of it can be); "fully cured: 12.2%" (Witt et al. 2011); "under homeopathic treatment the severity of the disease and the quality of life improved substantially, which supports the 'whole person' approach prevailing in contemporary homeopathy"; "homeopathic medical therapy may play a beneficial role in the long-term care of older adults with chronic diseases" (Teut et al. 2010).

The subsequent publications of this study relate to subgroups of patients with specific conditions at the two-year follow-up (Teut et al. 2010; Witt et al. 2009c; Witt et al. 2009b; Witt et al. 2010; Witt et al. 2011) (Table 1). The two-year follow-up results were published in two strikingly similar articles (Becker-Witt et al. 2004; Witt et al. 2005b). One of them falls outside the reporting period of the present analysis (Becker-Witt et al. 2004), and it is therefore only mentioned in the discussion of my analysis. In none of these articles was the disease in question diagnosed according to rigorous criteria. Even though sample sizes were often low (Table 1), the authors believe their results are "representative" (Witt et al. 2011).

All of these publications report highly encouraging results for homeopathy. The possibility that these findings might not be due to the treatment but caused by the natural history of the disease, regression toward the mean, placebo effects, the therapeutic relationship, other context effects, or a mixture of any of these factors is repeatedly mentioned but then either dismissed or deemed unlikely. In some instances, even the stated aim of the article seems to imply causality: "evaluate . . . effects of homeopathic treatment" (Witt et al. 2011), "our study was designed to evaluate homeopathic treatments" (Witt et al. 2011), "evaluating homeopathic treatment" (Witt et al. 2009b), "to evaluate . . . effects of an individualized homeopathic treatment" (Witt et al. 2010). Conflicts of interest were often not mentioned, but if they were, none were declared. Some of the articles in this series stated that the research was funded by the Carstens Foundation, an organization well-known for its pro-homeopathic stance.

The third category of articles (Keil et al. 2008; Witt et al. 2005a) is based on comparative cohort studies. For the first of these investigations, 493 patients with five selected chronic conditions were recruited by 101 homeopathic and fifty-nine conventional study physicians. These patients had chosen homeopathic and conventional healthcare according to their own beliefs and preferences. Therefore, the two groups yielded numerous significant differences at baseline, e.g., conventional patients were seven years older, had used more medical services in the past, and were more likely to be male. Half of the homeopathic cohort used conventional treatments in addition to homeopathy. Only scant details were provided about the treatments administered in each group.

The main outcome measures included a non-validated symptom score, quality of life, and overall costs. The latter was only available for 38 percent of patients, which seems to invalidate any conclusions regarding cost. Yet the authors fail to discuss this point critically and present these data as valid. The results seem to indicate that homeopathy "had a better overall outcome compared to . . . conventional treatment" (Witt et al. 2005a). The obvious fact that this could be due to a range of factors, including the lower age of these patients or the additional attention by homeopaths, is not critically discussed.

The data of the same study were submitted to a subgroup analysis of 118 children suffering from eczema (Witt et al. 2005a). In this paper, the authors again imply causal inferences that, due to the study design, are not warranted, e.g., "the extent of the improvement was significantly different, in favour of homoeopathically treated patients" or ". . . it is noteworthy that the outcome was at least similar (by patients' assessment) or significantly superior (by physicians' assessment) to conventional treatment" (Keil et al. 2008). Again, the study is presented as though it was a comparison of homeopathy with conventional care, while it was, in fact, a comparison of homeopathy plus conventional care versus conventional care alone.

One study was presented as though it was a comparison of homeopathy with conventional care, while it was, in fact, a comparison of homeopathy plus conventional care versus conventional care alone.

Witt et al. also published a separate but similar comparative cohort study with children suffering from eczema (Witt et al. 2009a). Again, the parents had selected either homeopathic or conventional based on their beliefs. Consequently, there were multiple baseline

differences between the relatively small groups (n = 48 and 87). Only scant details were provided about the treatments used in both groups. In particular, it is unclear to what extent the homeopathic physicians also employed conventional treatments. Neither was it clear on what basis the physicians decided to include some patients and exclude others. The primary outcome measure was a validated symptom score administered by blinded evaluators. The results showed no inter-group differences at six or twelve months, but a graph provided in the article depicts a steeper decline of the symptom score in the homeopathy group. The costs for homeopathic patients were about twice of those of the control group. Closer inspection of the results reveals that, because the homeopathic group was more severely ill at baseline, the apparent improvement in this group might have been due to a more pronounced regression toward the mean. Yet this possibility was not discussed by the authors of this paper.

This critical analysis is, of course, limited by the fact that only the publications of one research group were scrutinized. Thus, generalizations across the field of homeopathy are not permissible. Nevertheless, my evaluation suggests numerous flaws in the design, conduct, and reporting of clinical research in homeopathy recently published by the most prolific research unit in this area. It also reveals multiple publications of similar data, which might be regarded as ethically debateable. Most important, it points to a phenomenon that, according to my experience, seems to be common in this line of investigation (Ernst 2010): relatively weak data tend to be over- or misinterpreted to such an extent that the casual reader of such publications can be seriously misled. Consequently, homeopathy appears to have clinical effects which, with critical analysis, can be attributed to bias or confounding.

My evaluation suggests numerous flaws in the design, conduct, and reporting of clinical research in homeopathy recently published by the most prolific research unit in this area.

Future research in this area should be more rigorous and readers of biased research papers should apply appropriately critical assessments.

References

Becker-Witt, C., R. Ludtke, T. E. Weisshuhn, et al. 2004. Diagnoses and treatment in homeopathic medical practice. *Forsch Komplementarmed Klass Naturheilkd.* 11: 98–103.

Bewley, S., E. Ernst, J. Garrow, et al. 2011. The evidence for homeopathy is not positive: A rapid response to Bewley, S., On behalf of N. Ross, A. Braillon, E. Ernst, et al. Letter: Advice on homoeopathic products: Clothing naked quackery and legitimising pseudoscience *BMJ* 2011; 343:doi:10.1136/bmj.d5960.

Brinkhaus, B., J.M. Wilkens, R. Lüdtke, et al. 2006. Homeopathic arnica therapy in patients receiving knee surgery: Results of three randomised double-blind trials. *Complementary Therapies in Medicine* 14(4): 237–246.

Chatfield, K. 2011. Progress in the placebo debate for homeopathy? *Journal of Alternative and Complementary Medicine* 17(8):663–664.

Ernst, E. 2010. Classic flaws in clinical CAM research. *Focus on Alternative and Complementary Therapies* 15(3):207–209.

Fisher, P. 2011. Homeopathy: A rapid response to Bewley, S., On behalf of N. Ross, A. Braillon, E. Ernst, et al. Letter: Advice on homoeopathic products: Clothing naked quackery and legitimising pseudoscience *BMJ* 2011;343:doi:10.1136/bmj.d5960.

Keil, T., C.M. Witt, S. Roll, et al. 2008. Homoeopathic versus conventional treatment of children with eczema: A comparative cohort study. *Complementary Therapies in Medicine* 16(1): 15–21.

Sehon, S. and D. Stanley. 2010. Applying the simplicity principle to homeopathy: What remains? *Focus on Alternative and Complementary Therapies* 15(1): 8–12.

Teut, M., R. Lüdtke, K. Schnabel, et al. 2010. Homeopathic treatment of elderly patients—a prospective observational study with follow-up over a two year period. *BMC Geriatrics* 10: 10.

Witt, C., T. Keil, D. Selim, et al. 2005a. Outcome and costs of homoeopathic and conventional treatment strategies: A comparative cohort study in patients with chronic disorders. *Complementary Therapies in Medicine* 13(2): 79–86.

Witt, C.M., B. Brinkhaus, D. Pach, et al. 2009a. Homoeopathic versus conventional therapy for atopic eczema in children: Medical and economic results. *Dermatology* 219: 329–340.

Witt, C.M., R. Lüdtke, R. Baur, et al. 2005b. Homeopathic medical practice: Long-term results of a cohort study with 3981 patients. *BMC Public Health* 5: 115.

Witt, C.M., R. Lüdtke, N. Mengler, et al. 2008. How healthy are chronically ill patients after eight years of homeopathic treatment? Results from a long term observational study. *BMC Public Health* 8: 413.

Witt, C.M., R. Lüdtke, and S.N. Willich. 2009b. Homeopathic treatment of patients with dysmenorrhea: A prospective observational study with 2 years follow-up. *Archives of Gynecology and Obstetrics* 280(4): 603–611.

———. 2010. Homeopathic treatment of patients with migraine: A prospective observational study with a 2-year follow-up period. *Journal of Alternative and Complementary Medicine* 16(4): 347–355.

———. 2011. Homeopathic treatment of patients with psoriasis—a prospective observational study with 2 years follow-up. *European Journal Acta Dermatologica Venereological* 23(5): 538–543.

———. 2009c. Homeopathic treatment of children with atopic eczema: A prospective observational study with two years follow-up. *Acta Dermatologica Venereologica* 89(2): 182–183.

Edzard Ernst, MD, PhD, is emeritus professor in the Complementary Medicine unit, Peninsula Medical School, Exeter, U.K.

The Pseudoscience of Live Blood Cell Analysis

Of the many aspects of alternative medicine, one of the most bizarre is live blood cell analysis. This unapproved blood test supposedly identifies nutritional deficiencies and other nebulous conditions.

THOMAS PATTERSON

Take a simple scientific fact or term, build an elaborate fantasy on top of it, promote it, and you have pseudoscience. Live blood cell analysis by darkfield microscopy is an example. It sounds like a legitimate and valuable evidence-based diagnostic procedure; it is not.

Darkfield microscopy is a microscopic technique in which light strikes the observed material from the side rather than from underneath and through the material. The background is dark with the observed material highlighted by the lateral light source. In normal brightfield microscopy, the background is white or very light and the material is usually darkly stained to bring out fine details and colors not normally visible.

In medicine, the most common use of brightfield microscopy is in diagnostic applications. The commonly ordered complete blood count (CBC) is often partly done with stained smears of the patient's blood observed under brightfield microscopy. With this technique, the clinical laboratory scientist can observe very fine details about the size and shape of the red blood cells; the shape, size, and relative numbers of the white blood cells; and the presence or absence of platelets, those small cell fragments that cause blood to clot.

Darkfield microscopy is useful in the medical laboratory for identifying living spirochetes collected from an infected patient. These are corkscrew-shaped bacteria that can be seen wiggling and corkscrewing their way through the liquid or material in which they are suspended. However, the use of darkfield microscopy as part of a CBC or analysis of live blood is questionable. Because darkfield is by definition dark, most of the detail that is apparent in brightfield examination is invisible. The use of darkfield techniques in examining live blood for cellular shape and detail is suspect and is not offered by most reputable medical laboratories because it has little diagnostic value.

That fact has not deterred some alternative medicine practitioners from providing live blood cell analysis (darkfield blood analysis) to the unsuspecting public. In a typical scenario, the alternative medicine practitioner will have the darkfield microscope set up at a health fair or in his or her office. A video camera is connected to the microscope and feeds a video monitor so that the enlarged image is visible on the screen. For a fee, the practitioner will offer the test to a patient or attendee at a health fair.

The customers may be asked to prick their own fingers with a sterile lancet to obtain blood. It is illegal in some states for an alternative medicine practitioner to perform any invasive procedure on the public. In these states, the customers must perform the invasive procedure by collecting their own blood samples.

After a drop of blood oozes to the surface of the skin, the practitioner will dab it onto a glass cover slip and place the slip on a glass slide for observation under the darkfield microscope. The practitioner will then scan the slide and point out various features of the sample as the customer observes the screen in confused wonderment.

The problem is that most of these

practitioners are not trained medical professionals and are not qualified to examine a blood sample. Microscopes and video set-ups are available for purchase by anyone for $3,500 to $6,000. With the purchase of the set-up, a two- or three-day training course is offered. No one can be adequately trained in a couple of days to properly evaluate a blood sample. Laboratory professionals and pathologists must take years of training through accredited educational programs before they can competently perform a microscopic examination of blood cells.

Businesses that provide these microscope/video set-ups are careful in describing the purpose of their product. Most will say that their equipment is to be used for educational purposes only. Customers will supposedly be motivated to improve their lifestyles after seeing their blood on the video screen. The product is not to be used to diagnose, evaluate, or treat any disease or disorder. Undoubtedly, the purpose of this disclaimer is to prevent legal entanglements. Providing an unlicensed, nonvalidated test to diagnose disease or illness is unprofessional if not illegal.

However, in actual practice, most alternative practitioners will come close to a diagnosis as they review the blood sample. While reviewing the sample with the customer the practitioner will often observe "rouleau" formations of the red cells. Rouleaux occur when the red cells stack on top of one another and appear like stacks of coins. True rouleaux can be seen in patients with plasma protein abnormalities like multiple myeloma, but this is rare. Myeloma is a life threatening condition and requires medical attention.

The rouleaux observed by alternative medicine practitioners are almost always artifacts due to the slight drying of the blood sample around the edges of the coverslip or due to clumping in areas of the slide where there is a large concentration of red cells. In microscopy, an artifact is something that looks abnormal or odd but is actually insignificant and is ignored by a trained professional. Blood cells will normally start to clot and stack upon coming in contact with glass. Observation of red cell rouleaux on a darkfield microscope from a finger-stick sample obtained from a customer or patient is diagnostic of nothing.

If the slide is observed near the center of the coverslip, rouleaux are rarely seen. The red cells are free floating and are not attached to each other. The practitioner will often identify these red cells as "healthy." The customer can be misled by the practitioner moving the slide near the edge of the coverslip where false rouleaux are common or showing the field near the center where rouleaux are rarely seen. The practitioner can show the customer whatever he or she wants the customer to see by selecting a specific area of the slide.

According to some alternative practitioners, rouleaux are indicative of acid in the blood. Anyone who has taken a real anatomy and physiology course knows that blood is not acidic unless the person is acutely ill with respiratory or metabolic acidosis, conditions that are life-threatening. The kidneys will normally excrete excess metabolic acid into the urine while the lungs continually rid the body of excess carbon dioxide to keep the blood at the normal level of slight alkalinity; blood is never acidic unless the person is very ill.

Rouleaux are not caused by acidic blood, and people who are actually in severe acidosis would certainly not be well enough to be wandering around an alternative medicine health fair. Curiously, other practitioners will state that rouleaux are actually caused by a sluggish or weak pancreas that is not digesting protein properly.

Alternative medicine practitioners often demonstrate a complete lack of knowledge concerning basic biology—not to mention pathology or medicine. They will comment that the red cells are beginning to bud off bacteria from the edge of the red cell membrane. These small artifacts near the cell membrane are interpreted as bacteria being born. A high school biology student would know that this idea is implausible. One form of life cannot instantly transform into another. It is a biological impossibility for a red blood cell to transform into a bacterium. Each biological organism, from a blue whale to a Vidalia onion to a coliform bacterium, has a completely different genome or set of DNA that makes the organism unique. If the practitioner could actually identify bacteria in the blood, the customer is in danger and should request immediate transfer to the nearest emergency room to be treated for septicemia, a potentially life-threatening infection of the bloodstream.

A high school biology student would know that one form of life cannot instantly transform into another; it's completely implausible.

Some artifacts are mistakenly identified by the practitioner as yeast cells, one of the most common "findings" by alternative practitioners. Yeast cells cannot be seen in the blood of a healthy person for the simple reason that they are not there. An actual fungus (yeast) in the blood is seen in patients who are critically ill with some type of severe immune system deficiency. These individuals also will not be well enough to be wandering about at a health fair.

Often a microscopic shard of glass from the slide will be present in the microscopic field. These tiny shards are present on most slides unless the slide is carefully cleaned before use. The alternative practitioner will usually identify

these glass shards as uric acid crystals or cholesterol plaques, which are simply not visible in a blood sample.

Surprisingly, a "parasite" is often found in the blood during live blood cell analysis. Some of these so-called parasites appear to be slightly deformed red cells or microscopic particles of dirt and debris commonly visible on a glass slide. Legitimate medical laboratories never report "parasites" as a laboratory finding. The species of parasite must be identified by carefully observing individual anatomical features of the parasite's body or eggs so appropriate treatment can be implemented. The presence of real parasites in the bloodstream indicates a very serious medical condition.

The parasites (actually artifacts) seen by the live blood cell analyst simply cannot be identified because they do not have anatomical features. Additionally, people with real parasitic infections in the bloodstream are ill enough to seek legitimate medical treatment and are treated with antimalarial or antiparasitic drugs, the normal standard of care. Anyone with worms, trypanosomes (sleeping sickness), protozoa (malaria), or other free-living parasites in the bloodstream is in danger and is in need of immediate medical attention, not a nutritional herbal supplement that supposedly rids the body of pesky blood-borne parasites.

Light spots seen on the red cells are often identified as "fermentations" by the practitioner. Supposedly these are areas of the red cell undergoing fermentation due to the high sugar content of the blood. This fermentation interpretation demonstrates a lack of understanding of basic chemistry and physiology. Fermentation occurs when yeast produce enzymes that convert sugar to ethyl alcohol and carbon dioxide gas. This causes grape juice to turn into sparkling wine but does not cause red blood cells to develop white spots. Red blood cells do not contain yeast and cannot ferment anything; red cells have also never been observed to be full of alcohol and carbon dioxide gas bubbles. If yeast cells were actually fermenting sugar and forming alcohol in the bloodstream, one could be legitimately charged with driving under the influence after eating a doughnut. The light spots are actually artifacts and are not visible on many of the red cells observed throughout the microscopic field.

Conveniently, most of the serious-sounding conditions discovered by the practitioner can be resolved by waving a special "zero-point energy wand" over the body, eating special alkaline foods, drinking alkalinized water, or by taking a dietary supplement that the practitioner just happens to sell. Although no "diagnoses" are supposedly made, the practitioner will let the customers know that they have one or more of the following: an imbalance in their acids, free radical damage, a weakness in the liver or pancreas, a problem with their alkalophile organs (this mysterious classification of organs cannot be found in any reputable anatomy textbook), blood toxins, stress, poor lymphatic circulation, a tendency toward allergies, yeast in the blood, bacteria in the blood, blood parasites, hormonal imbalances, and a host of other vaguely worded but serious-sounding conditions.

If the customer takes the prescribed supplement or submits to a bizarre zero-point energy wand waving session and returns for a repeat darkfield examination, the original disorder has, more often than not, miraculously disappeared. Or was the practitioner examining the area of the sample near the center of the coverslip where the red cells appear normal, there are no rouleau formations, and few if any artifacts are seen at all?

Live blood cell analysis is not currently recognized by the laboratory profession as a worthwhile laboratory test because it reveals very little diagnostic information. One can only imagine the chaos that would ensue if legitimate laboratory tests had to bear the disclaimer: "This test is for educational purposes only and cannot be used to diagnose, evaluate, or treat any disease or disorder."

Laboratories that perform evidence-based medical laboratory testing in the United States are regulated by the Clinical Laboratory Improvements Amendment (CLIA) passed by Congress. This legislation requires that all highly complex medical laboratory tests be performed by qualified personnel and that all laboratory tests offered must be continually validated by special programs. Out of ignorance or to avoid these restrictive regulations, live blood cell analysts simply do not register their activity with the federal government and therefore are not inspected. The actual enforcement of medical laboratory standards in most cases falls under statutes set by each state. Some states have closed down live blood cell analysis when they are aware of such activity. Other states have not investigated the issue or simply allow alternative medicine practitioners to continue their practice.

There are several websites that currently demonstrate live blood cell analysis. These sites have the trappings of real science with the doctor title thrown about as if the procedure is being performed by a medical doctor. Most of these "doctors" have PhDs or medical degrees from schools of nutrition, herbal medicine, natural healing, or naturopathy. They have not published any peer-reviewed research findings in legitimate scholarly journals, have not produced a doctoral-quality dissertation, and have not graduated from any recognized academic university or accredited school of medicine. Many of these sites are interesting to watch. The Internet demonstrations of live blood analysis are sprinkled with quasi-scientific terms that can easily fool an unsuspecting public into thinking there is actual science involved.

The idea that wand waving, dietary supplements, and alkaline diets can cure the host of strange disorders identified during live blood cell analysis is certainly pseudoscience at its worst. The hope is that we are not slowly traveling backward in time toward Sagan's demon-haunted world through the eyepieces of our darkfield microscopes. ■

Thomas Patterson is currently a professor in the Clinical Laboratory Science Program at Texas State University where he teaches Clinical Research Methods, Molecular Diagnostics, Immunohematology, Immunology, and Clinical Laboratory Management. E-mail: tp20@txstate.edu.

Faith Healing and Skepticism in Pakistan: Challenges and Instability

With the rise of Islamic extremism in Pakistan, the country not only has to protect people from fraudulent healers but also has the challenge of protecting these fraudsters from violence.

RYAN SHAFFER

Pakistani skeptics face unique problems with the rise of lawless religious extremism on one hand, and a government that protects Islam on the other. Faith healing is an old tradition that no time period or culture has a monopoly on. Despite differences in religions, faith healers who claim to heal the sick through religious belief exist throughout the world. Some claim to be gods, prophets, or intermediaries between the physical and metaphysical realms. South Asia is no different in that regard. Whether people follow Islam or Hinduism, the believers who accept faith healing have a wide range of people who will take their money for promises of spiritual healing. While the "rat children" of Pakistan can be seen begging for money on the streets, in recent years faithhealers in several parts of Pakistan have disappeared from public view. Since 2008, many have taken their "healing" underground, making their activities more difficult to track. For skeptics, this would at first seem like a cause to celebrate. However, this drop should not imply the change is from public critical thinking and a growth of scientific skepticism. It has to do more with an alarming trend in the other direction, which has to do with the rise of religious violence in Pakistan.

As readers of the SKEPTICAL INQUIRER are well aware, faith healing attracts many types of people to its practice. These include outright frauds, people who believe their own unproven statements, and those who mix fraud and belief in their own claims. In North America and Europe, one might witness a pastor giving spiritual advice followed with an incantation where someone is "healed." Likewise in Pakistan, it might be a "Pir," an "elder" who gives his followers spiritual advice and a blessing. One Pir told *The News* that while there are some frauds "there are many who are serving the public through the verses of the holy Quran" ("Faith Healers" 2009). Official statistics about faith healing in Pakistan are difficult to obtain. Yet in 2005, some official numbers about the "prevalence of fake spiritual healers" were published under Home Minister Rauf Siddiqui. According to the *Daily Times*, the breakdown was: "91 fake faith healers and magicians operating in Sindh thus far, including 44 in Karachi, 31 in Hyderabad and 16 in Sukkur" ("Practices of Fake Faith Healers . . ." 2011).

In Gujrat, Pakistan, faith healing and child exploitation are combined with *chuhas* ("rats" in Urdu), which are better known as the "rat children" of Pakistan. On any given day at the shrine of Shah Dola (also spelled "Daula"), "hundreds of worshippers come to celebrate the life of one of Pakistan's most revered Sufi saints" (Galpin 1998). People bring their mentally retarded children to the shrine for a blessing, hoping it will make them better (Bragg 2001). Women also gather at the tomb praying for a cure for infertility. Yet if they then conceive, the myth goes, "the couple can expect their firstborn to be handicapped—a rat child with a tiny head. And it must be handed over to the shrine" (Galpin 1998). If the couples do not keep that commitment, God will punish them. Around the shrine are children who are mentally and physically deformed with microcephaly, or small skulls, supposedly with features like rats, and they cannot speak. These children beg for money from morning until night and usually have no problem getting it, since many believe the disabled are closer to God.

Many believe that people hand over healthy babies, which are then deformed to look like "rats" using crude devices and then sold to criminal organizations. According to Anusheh Hussain, head of Sahil—a nongovernment organization against child abuse—the children are sold for as low as 40,000 rupees (about $10). Pirzada Imtiaz Syed, a trade union leader, said: "I have not seen this myself but I have heard from many people that they use iron rings which are placed on the baby's head to stop it growing. I believe there are about 10,000 rat children in Pakistan controlled by a mafia of beggars who are all over the country. These children are also physically and sexually abused" (Galpin 1998). While people associated with the shrine deny that, and claim the deformity is genetic, Qasim Mehdi, Pakistan's top genetic scientist who studied the "rat children," said that it is "medically impossible" because a genetic disease must be carried in the family and passed through parents to children, but these children are not related. According to the Integrated Regional Information Networks, which

is an independent part of the United Nations, the theory that the children are forced "to wear metal caps which constrain the normal growth of the head" was developed and researched "by one of Pakistan's top scientists, who was then banned from talking about the issue following media exposure several years ago." (Integrated Regional Information Networks 2002).

South Asia provides unique problems for skeptics in the region compared with North America and Europe. With centuries of tradition and severe economic inequality throughout the region, superstition is rampant in Bangladesh, Pakistan, and India. In the case of India, since the 1970s, Indian rationalist groups have grown in number and influence but have also built ties with the international rationalist community. Basava Premanand (1930–2009) from Kerala, India, was an early post-independence rationalist speaker and writer, detailing how some Hindu gurus trick believers. In the 1970s, Premanand began criticizing Sathya Sai Baba (1926–2011), an Indian "God man," eventually founding the Federation of Indian Rationalist Associations, which coordinates the activities of dozens of rationalist associations throughout India. Another prominent figure is Prabir Ghosh who is a more recent Indian skeptic and writer who offers a cash prize similar to that of the James Randi Educational Foundation for demonstration of paranormal abilities in India. Their mission has not been easy. Indian skeptics have faced attacks in a variety of ways, including Premanand surviving four assassination attempts (Datta 2004).

Pakistanis have dealt with the problem differently, and due to political instability as well as blasphemy laws it also faces unique challenges. Mohammed Younus Shaikh is a medical doctor, rationalist, and human rights activist who started The Enlightenment, a rationalist society, in Pakistan in 1992. His organization came to a halt in October 2000, when he was charged with blasphemy for a lecture he supposedly gave at Capital Medical College. Not only did Shaikh deny committing blasphemy, he denied even giving a lecture there. Nonetheless, he was fined 100,000 rupees and sentenced to death (Price 2001). The law to prevent "derogatory remarks about Prophet Mohammed" was added to the Pakistani Penal Code in 1986, and remains on record despite attempts by President Musharraf to change the law just a year before Shaikh was arrested. For three years, the IHEU, the Sea of Faith, and Amnesty International campaigned for his release. He was finally acquitted of blasphemy in November 2003 and immediately fled to Europe. After his acquittal, he described the event as "Islamic terrorism through the abuse of law and of the state apparatus." When Shaikh left the country, Pakistan lost a critical voice against superstition and encouraged would-be skeptics to re-

This picture, taken on July 17, 2008, shows a Pakistani devotee touching the feet of Nadia, a twenty-five-year-old microcephalic "rat woman" at the shrine of Shah Dola. According to local legend, infertile women who pray at Shah Dola's shrine will be granted children, but the first child will be born microcephalic and must be given to the shrine or else any further children will have the same deformity. AFP PHOTO/Farooq NAEEM

main silent about religion. Despite the absence of skeptics questioning belief, there has recently been a change in faith healing activity throughout Pakistan.

With the rise of lawlessness in some areas of Pakistan that border Afghanistan, comes a trend that seems to be only increasing in areas without effective government. Since late 2007, places such as Peshawar, in the Federally Administered Tribal Areas, have seen an increase of instability caused by the Pakistani Taliban. From the lack of effective law enforcement, radical Muslims have been emboldened to attack and murder those they disagree with or who do not follow their interpretation of the Quran, which includes faith healers. They have attacked and threatened faith healers with claims that the "healers" are fraudsters misusing the Quran and misleading Islamic believers, or that the healers are false prophets.

In 2008 and 2009, many Pirs who practiced faith healing were picked up from around Peshawar and were released only when they promised no longer to engage in those activities. Others have not been so lucky. In January 2009, one faith healer was blown up by explosives in Peshawar after he was told to stop his "illegal and un-Islamic" practice, but did not submit to the intimidation. Several others were attacked as well, including one who was beheaded, and a faith healing business was also destroyed. In fact, Phool Badshah, a faith healer, was murdered within the limits of the Yakatoot Police Station jurisdiction. The police, it appears, have been powerless to stop these attacks.

In 2011, some segments of the Pakistani government began listening to critics of faith healing in other parts of the country. In Karachi, which has felt the lower levels of militancy, hundreds of faith healers openly do business. According to the *Daily Times*, "They are indulged in fleecing innocent masses with a sole purpose to extract money from them on the cost of their plights" ("Practices of Fake Faith Healers . . ." 2011). Umair Alam, who was taken advantage of, explained his situation: "I don't believe them any more as I have personally experienced their deceitful skills. I paid 25,000 [rupees] to a faith healer, who ran his business in Surjani Town, when I was trapped in a serious domestic problem. He initially assured me of getting all my problems solved within 45 days. But, subsequently, nothing happened and he refused to return my money, saying it will take more cash for solving the problem" ("Practices of Fake Faith Healers . . ." 2011). With stories of fraud and abuse as well as intimidation and murder in other parts of the country, the government has shown some interest in addressing fraud.

In June 2011, Nadia Gabol, Sindh Minister for Human Rights, described spiritual healing as "no more than a matter of money making." Gabol said that the practice should be banned. In fact, she announced, "It is a matter worth concern. After deliberations with our parliamentary leader, we will take this issue to the provincial assembly" ("Practices of Fake Faith Healers . . ." 2011). Likewise, Fayyaz Ahmed Laghari, the Inspector General Police in Sindh, said that action will be taken against the fraudsters when the police receive formal complaints. Time will tell whether the Pakistani government can protect its citizens from attacks and whether the authorities can stem the fraudulent activities of faith healers. Yet, it seems that at least government officials speaking about the problem is a move in the right direction.

There is no doubt that faith healers, who make promises to mentally and physically heal sick people, need to be scrutinized and should be held accountable for their claims. But this should be done through laws and courts, not through intimidation. With the rise of Islamic extremism in Pakistan, the country not only has to protect people from fraudulent healers but also has the challenge of protecting fraudsters from violence. Skeptics encourage critical thinking. The silencing of opponents through threats is not critical thinking but rather the opposite. Both skeptics and faith healers can agree: the violent intimidation and threats to Pirs is not acceptable. It remains to be seen what, if anything, the Pakistani government can do because the government needs to not only protect its citizens' safety and stop fraud, but it also needs stability. ■

References

Bragg, Rick. 2001. Seeking miracles in a place of cruelty and beauty. *New York Times* (October 28). Online at http://www.nytimes.com/2001/10/28/world/seeking-miracles-in-a-place-of-cruelty-and-beauty.html.

Datta, Tanya. 2004. Sai Baba: God-man or con man? BBC (17 June). Online at http://news.bbc.co.uk/2/hi/programmes/this_world/3813469.stm.

Faith healers: Another casualty of lawlessness in Frontier. 2009. *The News* (February 23). Online at http://www.thenews.com.pk/TodaysPrintDetail.aspx?ID=164058&Cat=7&dt=2/22/2009.

Galpin, Richard. 1998. The rat children of Pakistan. BBC (29 June). Online at http://news.bbc.co.uk/2/hi/south_asia/122670.stm.

Integrated Regional Information Networks. 2002. Pakistan: Focus on rat-children. United Nations (14 October). Online at http://www.irinnews.org/report.aspx?reportid=18638.

Practices of fake faith healers unnoticed. 2011. *Daily Times* (June 6). Online at http://www.dailytimes.com.pk/default.asp?page=2011\06\06\story_6-62011_pg7_4.

Price, Susannah. 2001. Pakistani sentenced to death for blasphemy. BBC (18 August). Online at http://news.bbc.co.uk/2/hi/south_asia/1498121.stm.

For Further Reading

Dugger, Celia. 2001. Pakistani sentenced to death for blasphemy. *New York Times* (August 20). Online at http://www.nytimes.com/2001/08/20/international/asia/20DOCT.html.

Faith healer killed near Peshawar. 2009. *Daily Times* (February 18). Online at http://www.dailytimes.com.pk/default.asp?page=2009%5C02%5C18%5Cstory_18-2-2009_pg7_37.

Kemp, Danny. 2008. 'Rat people' forced to beg on Pakistan's streets. *Sydney Morning Herald* (August 2). Online at http://news.smh.com.au/world/rat-people-forced-to-beg-on-pakistans-streets-20080802-3oqf.html.

International Humanist and Ethical Union. 2004. Campaigning for the release of Dr Shaikh. (1 February). Online at http://www.iheu.org/node/1008

Rationalist International. 2001. Dr. Shaikh sentenced to death. Online at http://www.rationalistinternational.net/Shaikh/2001.08.26.htm.

Ryan Shaffer is a historian and writer. He is currently a PhD candidate in history at the State University of New York, Stony Brook.

A Golden Age of Harmony? Misrepresenting Science and History in the *1001 Inventions* Exhibit

Its intentions may be good, but a major new exhibit disregards serious differences between medieval and modern science and warps history to serve a present-day agenda of perfect harmony between science and Islam.

TANER EDIS AND SONJA BRENTJES

Visitors to The National Geographic Museum in Washington, DC, between August 2012 and February 2013 will encounter a touring exhibition called *1001 Inventions: Discover the Golden Age of Muslim Civilization*. The exhibit is impressive and has won various awards and gathered endorsements from figures such as Charles, the Prince of Wales. The exhibit and accompanying catalog and website (www.1001inventions.com) are lavishly illustrated and richly produced. With past appearances in London's Science Museum, Istanbul, the New York Hall of Science, Abu Dhabi, and the California Science Center in Los Angeles, *1001 Inventions* tells a story of how, between the seventh and seventeenth centuries, Muslim scientists made groundbreaking discoveries that eventually shaped the modern world.

According to the exhibit and catalog (Al-Hassani 2012), Muslims laid the foundations of modern science and technology. Great Muslims of the past—mathematicians, astronomers, chemists, physicians, architects, engineers, economists, sociologists, artists, artisans, and educators—expressed their religiosity through beneficial contributions to society and humanity. They were the first to discover or invent much in the sciences, technologies, industries, and daily life; and when Muslims continued earlier scholarly projects they often revolutionized their treatment.

Much of this story, however, is not accurate. Certainly, it does not hurt to be aware that modern science and technology did not appear out of the blue in Western Europe, and that scholars in medieval Muslim societies did not merely preserve and transmit the knowledge of antiquity. There were times when the richest intellectual life on the planet was to be found in places where Islam was the dominant religion. But *1001 Inventions* is a missed opportunity to raise awareness about the history of science. The exhibit presents a series of heroic tales of medieval Muslim discoveries from out of nowhere, with no context, and with a disregard for accuracy that shades into pure fiction. The term "Golden Age" is occasionally used by historians of science to describe the vibrant intellectual life in a number of predominantly Muslim societies between the eighth and fourteenth centuries. The exhibit *1001 In-*

ventions, however, draws on a more popular, mythic conception of a Golden Age. It disregards serious differences between medieval and modern science and warps history to serve a present-day agenda of perfect harmony between science and Islam. It promotes serious misunderstandings of science and history.

Egregious mistakes and disregard for professional standards are very common throughout the exhibit catalog. A few examples give the flavor.

Flight. *1001 Inventions* portrays the ninth-century Andalusian Ibn Firnas as the first person to build a flying machine. The catalog goes on for many pages, describing his success at flight, his design improvements, an injury he sustained in a flight attempt, and so forth (pp. 296–98). It gives artistic impressions of Ibn Firnas strapped with what looks like a frame resembling bird or bat wings. The legend of Ibn Firnas's flight is popular among many Muslims today; there is an airport north of Baghdad named after him. And yet, this claim of successful powered flight—with wings made out of eagle feathers, no less—is based mainly on a few sentences in a Moroccan chronicle from seven hundred years later. *1001 Inventions* also endorses and expands on the similar Turkish legend of Hezarfen Ahmet Çelebi, who allegedly used eagle feathers to fly over Istanbul in the seventeenth century, according to another few sentences by a chronicler. (A small airport in Istanbul is named after Hezarfen.) The sparseness of the historical evidence for these feats is evident even with a simple Wikipedia check, and at face value, flight with muscle-powered wings is physically impossible. And yet, *1001 Inventions* not only endorses notoriously unreliable accounts but indulges in lengthy and purely fictional elaborations.

Optics. A section on "Vision and Cameras" highlights Ibn al-Haytham in the tenth century and the first half of the eleventh. Indeed, Ibn al-Haytham's work is recognizably in the tradition of what became physics in today's sense, and it should be better known. But *1001 Inventions* presents his optics in a vacuum. Its major illustration is the *camera obscura*, but other philosophers, astronomers, bureaucrats, and architects long before Ibn al-Haytham analyzed the working principles of the *camera obscura*, wrote about it, and described some of its properties: not only Aristotle or Theon of Alexandria, but allegedly also MoTzi in fifth-century BCE China, Anthemius of Tralles, or al-Kindi. Ibn al-Haytham did not invent the device nor did he develop it to any higher level of complexity or accuracy. Ibn al-Haytham's main contributions consisted of the theoretical interpretation of what he saw and in the systematic character of some of his experiments. The catalog says Ibn al-Haytham was "the first to totally reject the theory of the Greeks." However, his theory of vision combines concepts, methods, and questions from ancient Greek philosophy, optics, and mathematics, which he critically sorted, taking important concepts like the Aristotelian form or the Euclidean geometrical ray aboard his new theory, as well as Ptolemy's experiments on reflection and Euclidean geometry.

The misplaced emphasis of *1001 Inventions* on "the first inventor or discoverer" leads the catalog to declare that

A scale model of al-Jazari's elephant clock (left). Despite the exhibit's claims, the clock was not the "first robotics with moving, time-telling features. The supposed ninth-century flight of Ibn Firnas, pictured in an artist's impression (right), would have been actually impossible.

the "ninth-century polymath al-Kindi first laid down the foundations of modern day optics by questioning the Greek theories of vision. He said that how we see, our visual cone, is not formed of discrete rays as Euclid had said, but appeared as a volume, in three dimensions, of continuous radiation" (p. 54). Peter Adamson has studied some of the modifications of the texts known as *Euclid's Optics* and those derived from them in Arabic and Latin. He places al-Kindi in the tradition of the Pseudo-Euclidian De Speculis and Johannes Philoponus (sixth century) who are among the many mostly anonymous teachers and students who modified older positions in the light of philosophical debates about how we see, debates that were clearly anchored in the intellectual and instrumental contexts of Late Antiquity (Adamson 2006, 213-4). The almost complete erasure of such ancient contexts as well as the contexts of Muslim scholars themselves makes it impossible to understand the achievements of those scholars, their new contributions, and their conceptual peculiarities, limitations, and errors. Claims of al-Kindi laying the foundations of modern-day optics are gross exaggerations resulting from a lack of knowledge about ancient Greek and medieval Arabic as well as Latin texts on optics and the differences between these theories and today's geometrical optics.

Al-Jazari's so-called "elephant clock" was not "the first robotics with moving time-telling figures." Reports about analogous automata are well attested for pre-Islamic cultures.

Clocks. The section on clocks features al-Jazari, who "was a pious Muslim and highly skilled engineer who gave birth to the concept of automatic machines." Whether he was a pious Muslim is as unknown as almost everything else about him, except for his works, extant in manuscripts, and possibly a few material objects like clocks. Reading his work on ingenious mechanical devices teaches us, however, that al-Jazari did not see himself as the birth giver of automatic machines or their conceptualization or as an engineer, but as the head of what perhaps signifies constructions (*ra's al-'amal*), as which he was apparently highly appreciated.

Al-Jazari's so-called "elephant clock" was not "the first robotics with moving time-telling figures." Reports about analogous automata are well attested for pre-Islamic cultures. It is highly unlikely that al-Jazari's clock "celebrated the diversity of humankind" (p. 44; in the second edition, this claim had a stronger religious connotation, ascribing to al-Jazari the intention "to celebrate the diversity of mankind and the universal nature of Islam"). These were

A map drawn in the twelfth century by al-Idrisi on display at the *1000 Inventions* exhibit.

not concerns of his time and culture, for which the diversity of humankind and its celebration are completely anachronistic ideas. Historical chronicles of the period aggressively stand against those that are diverse—those that deviate from the writers' own beliefs and cultural affiliations. *1001 Inventions* defends the idea that al-Jazari celebrated humankind's diversity by pointing to the various animals decorating the clock. This interpretation ignores the difficulties that art historians have in identifying the origins of the forms and figures. Caution is needed to find probable meanings of symbols at a concrete place and in a specific time.

Identifying the direct precursors of today's research and educational institutions in medieval Muslim societies is the work of ideology, not scholarship.

Education. The chapter on "school" begins with two fundamentally wrong claims in its introductory summary (p. 63), namely that: (1) "the medieval Muslims excelled in learning, from the primary-level mosque schools through to universities and the illustrious House of Wisdom, an intellectual academy in ninth-century Baghdad"; and (2) "the ethos of learning was a culture where enquiring minds searched for truth based on scientific rigour and experimentation, where opinion and speculation were cast out as unworthy pupils. This system of learning embodied by medieval Islam formed the backbone and foundation from which came forth the exceptional inventions and discoveries."

Not a single word in these two sentences can be backed by medieval sources. Not only were there no universities at the time, madrasas as institutions teaching some parts of mathematics and astronomy are later creations only vaguely similar to universities. In general, there were no primary-level mosque schools in all Islamic societies that provided basic education to all boys. There were a limited number of such schools that usually had one teacher and a patron. The situation differed from city to city, town to town, village to village, or even quarter to quarter. Identifying the direct precursors of today's research and educational institutions in medieval Muslim societies is the work of ideology, not scholarship.

These gross errors are just a sample—similar problems repeatedly show up throughout the exhibition catalog. Such errors are not attributable to the inevitable simplifications necessary to present complex historical matters to the general public, including schoolchildren. Curators are typically experts themselves and also work closely with other academic experts to produce exhibits that are both accurate and accessible while paying attention to appropriate contexts. *1001 Inventions* claims to have relied upon reputable academic resources, and includes some notable historians of science in its list of consultants. Nonetheless, the result is still a mass of distortions that serve a present-day agenda.

Indeed, the agenda behind *1001 Inventions* is explicit—to boost respect for a Muslim civilizational heritage, and to prevent Muslims, especially young Muslims, from feeling as if they are outsiders to modern scientific and technological enterprises. These are legitimate aims. It is also legitimate to oppose Eurocentric conceptions of history, which, though not very influential among the present generation of scholars, may still have some effect on popular views of science and the history of science.

But *1001 Inventions* pursues these legitimate aims by setting up a crude counter-myth. In its version of history, a heroic, conventionally devout set of Muslims act as civilizing agents for the rest of the world, laying the foundations for much of modernity. The exhibit is blind to differences between today's science and its medieval precursors, and sets up its myth of a Golden Age precisely in order to overcome present cultural difficulties involving science. Naturally, the exhibit presses many elements of popular Muslim apologetics into service, such as the common notion that historical tensions between science and religion are artifacts of the Western Christian experience that do not apply to Islam (Aydın 2000, 86). To further this view, *1001 Inventions* presents an absurd picture of science—equated to modern science—taught in medieval mosques, in an environment of complete harmony between revealed religion and knowledge about nature:

> There was little distinction between religion and knowledge as the mosque was both the place of prayer and the place of learning. Subjects included science, so science and religion sat side by side comfortably, which was not the case in other parts of the world. (Al-Hassani 2012, 64)

Such an apologetic agenda is not just an innocent device to boost the confidence of Muslim students. Myths of a Golden Age and a frictionless harmony between Islam and science are major aspects of today's popular Muslim conceptions of science—and these myths are closely connected to the extensive and popular religiously colored pseudoscientific beliefs found in Muslim populations (Edis 2007). *Perhaps* beliefs such as a Golden Age of harmony between science and religion may make science less alien to Muslim students, overcoming culturally defensive attitudes. There is no good evidence to this effect. However, there is plenty to indicate that when traditional beliefs such as a divine design in nature confront naturalistic scientific theories such as Darwinian evolution, the notion of harmony shields traditional beliefs from criticism. Both in terms of public support and penetration into public education systems, the strongest, most successful versions of creationism today are rooted in Islamic apologetics (Edis 2007; Hameed 2008).

The myth of a Golden Age is understandable, maybe even predictable. After all, after the Industrial Revolution, many societies confronted the suddenly overwhelming military and commercial advantage enjoyed by European empires. This advantage was clearly based on science and technology. Therefore the cultural elites of many suddenly subordinated societies were motivated to appropriate science for themselves. Buddhists and Hindus, as well as Muslims, looked to their own pre-modern traditions for traces of science. They sometimes claimed that they had set the stage for modern science, always asserting harmony between true science and religion—often leading to difficulties with evolution by natural selection (Lopez 2008; Brown 2012). Chinese and Japanese elites, like many Muslims, decided to adopt modern technology but also to guard against those aspects of Western thinking that might corrupt spiritual and moral beliefs (Buruma and Margalit 2004). Recently, the United States had an episode of "Afrocentric" pseudoscience, attributing the foundations of modern science to Africans and promoting a distorted view of science in harmony with spiritual and paranormal beliefs (Ortiz de Montellano 1991; 1992). One of the motivations expressed for Afrocentrism was its alleged value for African American students who felt culturally excluded from educational narratives about the advancement of science.

Imagining a Golden Age of harmony between science and Islam, however, is problematic beyond falsifications or decontextualizations of history. Perhaps its most important mistake is what *1001 Inventions* exemplifies so well: overlooking the major differences between medieval and modern science. *1001 Inventions* translates medieval science and technology into the scientific and technological idiom of today, suggesting closeness, similarity, or even identity between medieval scientific results and technological products and today's sciences and technologies. It does not warn readers and visitors that many of the disciplines, concepts, methods, or devices named in the book and the exhibit were conceived of by their medieval authors or producers differently, or that disciplines like physics, biology, and chemistry did not exist yet, but came into being much later and in other contexts. By selectively presenting only what they believe can be linked to modern knowledge, those responsible for the exhibit misrepresent a medieval intellectual environment where astrology or various medical superstitions were as respectable as innovations in planetary models or medical theory. *1001 Inventions* implies that medieval intellectual and material achievements are the same as the modern forms the writers, editors, and curators gave them when using modern labels, formulas, materials, and visual identifications.

> The exhibit is blind to differences between today's science and its medieval precursors, and sets up its myth of a Golden Age precisely in order to overcome present cultural difficulties involving science.

This identification of medieval and modern science has negative consequences. A Golden Age myth suggests that instead of adopting a significantly different way of thinking about nature, Muslims need only to reinstate medieval conceptions of nature and medieval habits of thought in order to become creatively engaged in cutting-edge science and technology. That is exactly the wrong thing to do. To the extent that a Golden Age myth influences science and education policy, it is likely to undermine rather than support efforts to improve the present contributions of Muslim populations to science and technology.

1001 Inventions misrepresents science and the history of science. It is especially unfortunate that the exhibit is being hosted by the National Geographic Museum, given the influence National Geographic has in popularizing science in the United States. By uncritically presenting a myth of a Golden Age of harmony, they are performing a serious disservice to the public understanding of science and history. ■

References

Adamson, P. 2006. Vision, light, and color in al-Kindī, Ptolemy and the ancient commentators. *Arabic Sciences and Philosophy* 16: 207–36.

Al-Hassani, S.T.S. (ed.). 2012. *1001 Inventions. The Enduring Legacy of Muslim Civilization*. 3rd Edition, Washington, DC: National Geographic.

Aydın, M.S. 2000. *İslâmın Evrenselliği,* İstanbul: Ufuk Kitapları.

Brown, C.M. 2012. *Hindu Perspectives on Evolution: Darwin, Dharma, and Design.* New York: Routledge.

Buruma, I., and A. Margolit. 2004. *Occidentalism: The West in the Eyes of Its Enemies.* New York: The Penguin Press.

Edis, T. 2007. *An Illusion of Harmony: Science and Religion in Islam.* Amherst, New York: Prometheus Books.

Hameed, S. 2008. Bracing for Islamic Creationism. *Science* 322: 1637–38.

Lopez Jr., D.S. 2008. *Buddhism and Science: A Guide for the Perplexed.* Chicago: University of Chicago Press.

Ortiz de Montellano, B. 1991. Multicultural pseudoscience: Spreading scientific illiteracy among minorities. SKEPTICAL INQUIRER 16(1): 46–50.

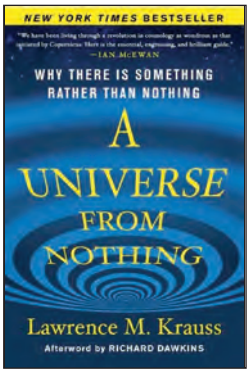
———. 1992. Magic melanin: Spreading scientific illiteracy among minorities. SKEPTICAL INQUIRER 16(2): 163–66.

Taner Edis is professor of physics at Truman State University and author of *An Illusion of Harmony: Science and Religion in Islam*.

Sonja Brentjes is researcher at the Max Planck Institute for the History of Science, Berlin, and author of *Travellers from Europe in the Ottoman and Safavid Empires, 16th–17th Centuries: Seeking, Transforming, Discarding Knowledge*.

How to Get Something from Nothing

MARK ALFORD



A Universe from Nothing. By Lawrence M. Krauss. Free Press (Simon and Schuster), New York, 2012. ISBN-13: 978-1-4516-2445-8. 204 pp. Hardcover, $24.99.

There are two voices in Lawrence Krauss's new book, *A Universe from Nothing*. One is that of Krauss the science popularizer, carefully leading his readers through the intricacies of modern cosmology. The other is that of Krauss the antitheistic rhetorician, eager to deflate philosophy and theology by denying their ability to make any contribution to "the truly fundamental questions that perplex us about our existence." I had quite different reactions to these two personas.

Krauss uses the philosophical question of whether "Something can come from Nothing" as a recurring theme in his voyage to the forefront of cosmology. His explanations of the science are first-rate. They constitute most of the book and make it worth reading. However, I was not convinced by his claim that science gives a positive answer to the question of whether Something can come from Nothing. I also found it hard to discern a coherent viewpoint in the (anti) philosophical rhetoric with which he surrounds the science: there were expansive claims on behalf of science but also expressions of a more modest view of its reach.

To start with the rhetoric, most skeptics will share Krauss's irritation at theologians who seriously propose that we need God as the "first cause" of the universe. As he notes (173), these arguments can be refuted in short order by pointing out that the God of religion is loaded with far more assumed properties than are required for a first cause. After making this point, I think the antitheist's best bet is to stop talking. If you try to make it seem as if science can answer the big questions that religion claims to address then you will likely end up offering science-inspired speculations that undermine your own skeptical credentials. Krauss starts by shrugging off such inhibitions, offering science as the answer to "deep questions" (xvi, 182). But later in the book he seems to assign it a more limited role.

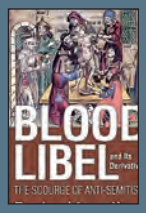
If you want to apply science to big questions like "can Something come from Nothing?" then, as Krauss makes clear (144), you need a scientific formulation of the question that allows it to be tested by experiment. However, his efforts to define Nothing seem half-hearted; he mostly defines it as "empty space," which is not noticeably more precise. He also proposes "equal amounts of matter and antimatter" (177) and "space filled with a constant energy density" (103), both of which sound more like Something than Nothing. There are sharper definitions available: the most obvious would be "all the degrees of freedom are in their lowest-energy state (ground state)"; we will return to this below. A more radical definition would be "no degrees of freedom at all," in which case it would certainly be impossible to get Something from Nothing.

The bulk of the book (its first eight chapters or so) is dominated by the familiar voice of Krauss the science popularizer. Krauss unveils an extremely understandable introduction to modern cosmology. He starts off with dark matter, the unidentified but now almost indisputable extra ingredient whose presence in galaxy clusters has been revealed by the way its gravitational field bends light passing through the cluster from more distant objects. He spends one chapter on the "flatness" of the universe, which can be inferred from the pattern of microwave brightness that we observe in the sky. An apparent detour into quantum mechanics and the energy of "virtual particles" prepares us for more exotic and speculative aspects of cosmology, starting with "dark energy," a completely mysterious background of uniformly spread-out energy that is posited to explain the recently noticed acceleration of the expansion of the universe. Krauss spends a chapter drawing out the dismal consequences: if the universe continues its accelerating expansion then most of it will disappear from view, leaving future astronomers in a cooling, shrinking prison. More cheerfully, the same acceleration process, occurring in a violent burst early in the Big Bang, gives us inflation, an ex-

planation of the flatness of the observed universe. Krauss's coverage of these topics is both expert and informal. Using a combination of historical anecdotes, down-to-earth examples, and simple diagrams, he manages to communicate both well-established science and cutting-edge research in a way that will be accessible to almost any reader.

In places throughout the book, and in a more sustained way in later chapters, Krauss returns to the question of whether the science that he has described shows that one can get Something from Nothing. His strongest pronouncement is that theologians and philosophers have "no foundation in science" for their contention that Nothing will always remain Nothing (174). Here Krauss is making an interesting and provocative claim, but I think it is an overstatement. If one uses a natural scientific definition of Nothing, namely "the lowest-energy state of a system," then it is a simple consequence of Schrödinger's equation that this state will never evolve into any other state. Krauss suggests that "fluctuations" in the ground state can be the source of Something, but this is really just an artifact of using classical language that obscures the static and unchanging nature of the quantum mechanical ground state. The only way such so-called fluctuations can become real is through the influence of an "environment" consisting of additional degrees of freedom that, through a process called "decoherence," effectively measure the state of the original system. But decoherence will not occur if the environment is also in its ground state (C. Kiefer and D. Polarski, *Advanced Science Letters* 2, 164173 [2009]). So, as long as we are in the realm of conventional quantum mechanics, current science supports the theologians: Nothing will always lead to Nothing. Conventional quantum mechanics, however, does not include the dynamic flexing of space that we think is an essential aspect of gravity. For that, one would need a theory of quantum gravity. Krauss (as usual being admirably clear about the fact that he is stepping into speculative uncertainty) outlines some ideas that have been suggested about the quantum-gravitational nucleation of "baby uni-

[NEW AND NOTABLE



BLOOD LIBEL AND ITS DERIVATIVES: The Scourge of Anti-Semitism. Raphael Israeli. This sociological and folkloric book examines the persistent and pernicious claims of blood libel—that Jews kill children to use their blood in religious ritual. Israeli traces the history of this myth into past centuries and examines how blood libel is used in the modern world to justify and perpetuate anti-Semitism. Transaction Publishers, 2012, 250 pp., $39.95.

PSYCHOLOGY OF SCIENCE: Implicit and Explicit Processes. Robert W. Proctor and E.J. Capaldi, eds. This book brings together scholarly contributions from leaders in the emerging discipline of the psychology of science (focusing on individual scientists' biases, intelligence, motivations, etc.) with other experts on the roles of implicit and explicit processes in thinking. Focusing on the role of implicit processes in the creation of scientific knowledge, the twenty contributors link the psychology of science to many areas of psychology, including cognitive, social, and developmental psychology. Oxford University Press, 2012, 520 pp., $89.99.

THE SCOPE OF SKEPTICISM: Interviews, Essays, and Observations from the Token Skeptic Podcast. Kylie Sturgess. Educator and veteran skeptic Kylie Sturgess presents nearly twenty of the best interviews from her popular *Token Skeptic* podcast. Interviewees include Tim Minchin, Caroline Watt, Daniel Loxton, Pamela Gay, Stephen Fry, Scott Sigler, Indre Viskontas, and Sharon Hill discussing a wide variety of subjects including pseudoscience, atheism, skeptical activism, fake bomb detectors, and much more. Sturgess also includes her insights and commentary on the 2010 Global Atheist Convention and other topics. PodBlack Books, Sydney, Australia, 2012. 150 pp., $15; also available as an e-book at Lulu.com for $7.

THE SECRET HISTORY OF POLTERGEISTS AND HAUNTED HOUSES: From Pagan Folklore to Modern Manifestations. Claude Lecouteux. Lecouteux, a former professor of medieval literature, examines ghost and poltergeist claims ranging from ancient Greece to the modern world. Though at times credulous, the book is well referenced and provides rich historical insight into the cultural and folkloric traditions of demons, ghosts, and poltergeists. Inner Traditions, 2012, 245 pp., $18.95.

—Benjamin Radford

Listing does not preclude future review.

verses" and the possible origin of our universe from them.

However, this does not imply that one is getting Something from Nothing. As Krauss himself notes (182), theories of quantum gravity may not contain anything corresponding in a straightforward way to our current concepts of Nothing and Something. This leaves one unable to come to any scientific conclusions about questions involving these concepts. At this point, the science of Nothing is overwhelmed by so much ambiguity and speculation that I am not sure how much advantage it has over theology.

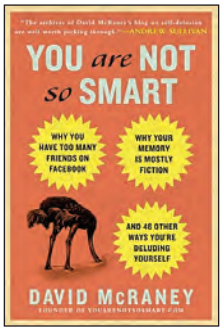
It is remarkably enjoyable to read a book and find it full of insightful truths, especially when it is spiced with provocative authorial contentions. I am impressed at Krauss's strong commitment to evidence over prejudice. He always tells the reader how much evidence supports the ideas he is presenting.

His discussion of the anthropic principle is excellent, and it includes the rarely emphasized point that in order for it to be a genuine explanation one needs to know the underlying probability distribution (176). I loved his quotation from Richard Feynman, rejecting the idea that science is a search for ultimate laws of physics (177); I think it shows that Feynman understood that science is not in the business of answering the "big questions." To quote Krauss himself, "what is really useful is not pondering this question but rather participating in the exciting voyage of discovery . . ." (178). In other words, after all the promises of scientific answers to the big questions, the whole question of Something from Nothing turns out to be a nice authorial device for motivating a wide-ranging explanatory tour through modern cosmology. And there's no question that Krauss is one of the master tour guides, with the rare gift of bringing understanding of science to audiences far beyond the ivory tower of academic research. ■

Mark Alford is chairman of the Physics Department at Washington University in St. Louis.

Not So Smart Thinking

DANIEL GRASSAM


YOU are NOT so SMART
WHY YOU HAVE TOO MANY FRIENDS ON FACEBOOK
WHY YOUR MEMORY IS MOSTLY FICTION
AND 46 OTHER WAYS YOU'RE DELUDING YOURSELF
DAVID McRANEY

You Are Not So Smart: Why You Have Too Many Friends on Facebook, Why Your Memory Is Mostly Fiction, and 46 Other Ways You're Deluding Yourself.
By David McRaney.
Gotham Books, New York, 2011. ISBN 978-1592406593.
320 pp. Hardcover, $22.50.

If you're looking for a collection of cognitive blunders, mental oversights, and errors of judgment that is brief, accessible, and enjoyable to read, David McRaney's *You Are Not So Smart* might be the book you seek. If you are looking for a book that can help you understand why other people keep making these mistakes that are so obvious and cleverly avoided, then *You Are Not So Smart* is the book you need. In forty-eight short chapters (some very short, at just three pages), McRaney outlines as many different ways that you are fooled by your own mind. McRaney's goal is that as you read the book, "You will start to see yourself in a new way. You will soon realize that you are not so smart, and thanks to a plethora of cognitive biases, faulty heuristics, and common fallacies of thought, you are probably deluding yourself minute by minute."

The first chapter, "Priming," outlines how much our desires and thoughts are affected by everything that surrounds us. The following chapter discusses confabulation and describes our personal narratives as "Based on a True Story." In chapter after chapter McRaney corrects the misconception we have about being in control of our feelings and desires. (Chapter 47 is specifically called "The Illusion of Control.") And it is not just we humans that suffer from these problems. Certain Australian beetles are attracted to beer bottles for the same reason that some women are attracted to wealthy octogenarians: supernormal releasers (stimuli). One of the delusions from the book's subtitle, our memory, is discussed in Chapter 32, "The Misinformation Effect." In just eight pages McRaney covers false memories, the social contagion of memory, and the impact of language on memory. He even includes, as he does in a number of chapters, a little experiment that you can try yourself to demonstrate what he is discussing, making the book interactive as well as informative.

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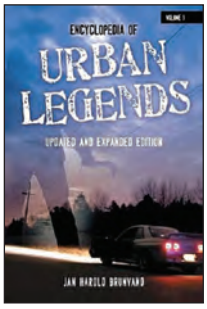
Each chapter starts with a brief description of the faulty thinking followed by what science has to say. An example from Chapter 12 on apophenia: "The Misconception: Some coincidences are so miraculous, they must have meaning. The Truth: Coincidences are a routine part of life, even the seemingly miraculous ones. Any meaning applied to them comes from your mind." McRaney summarizes the entire chapter in just a few sentences. If you wanted the ultra-condensed version of the book you could just read the two opening sentences to every chapter, but if you did you would miss out on McRaney's relaxed and conversational style. Not one to avoid the occasional curse word, McRaney takes the contents of psychology journals and turns them into what could be an entertaining conversation over drinks. Despite the casual tone, the book is complete with references to those psychology journals and other source material. Don't look for an index though.

McRaney, a journalist and self-described psychology nerd, does a thorough and entertaining job of taking what can be complex subjects and encapsulating them into a few easy-to-read pages. He covers everything from the more commonly known straw man fallacy and confirmation bias, to the lesser known embodied cognition and self handicapping. The book is full of so many different examples of mental shortcomings that it is likely there are some that you have not heard of before. If, after finishing the book, you find you want more, you can visit the website at www.youarenotsosmart.com. Like a sushi train of cognitive edibles, *You Are Not So Smart* delivers nearly fifty different reasons why you are not as awesome as you think you are. But don't despair; everyone else is just as bad. ■

Daniel Grassam writes from his home in Auckland, New Zealand. Email: daniel@simonpure.co.nz.

A Book of Stories that Happened to a Friend ...

BENJAMIN RADFORD



Encyclopedia of Urban Legends: Updated and Expanded Edition. By Jan Harold Brunvand. ABC-CLIO, Santa Barbara, 2012. ISBN: 978-1-59884-720-8. 782 pp., $173.

With his new *Encyclopedia of Urban Legends: Updated and Expanded Edition*, Jan Brunvand—the professor emeritus of English at the University of Utah widely considered to be the world's foremost expert on urban legends—updates and greatly expands his previous magnum opus of folklore.

This book is more than just a collection of urban legends—it also includes interesting entries on important folkloric concepts and topics such as Memorates ("a first-person account of a personal experience with the supernatural"), Bogus Warnings, the Satanic Panic, and my favorite, the Body Parts Legends.

Brunvand is author of many books on urban legends that are (or should be) familiar to skeptics, including *The Baby Train*, *The Choking Doberman*, and *The Vanishing Hitchhiker*. Brunvand's other books provide much more detail, history, and variations of the legends, but for a comprehensive single source, this encyclopedia (which runs nearly 800 pages over two volumes) is the best of its kind. The entries are generally short, ranging from a paragraph to a few pages, and give a concise narrative of the legend and some analysis. Each entry provides references, and many of them are cross-referenced with other entries, Brunvand's books, other books on urban legends, folklore journals, and even the occasional Snopes.com page.

This book is more than just a collection of urban legends—it also includes interesting entries on important folkloric concepts and topics such as Memorates ("a first-person account of a personal experience with the supernatural"), Bogus Warnings, the Satanic Panic, and my favorite, the Body Parts Legends. Folklore, because it is amorphous and constantly changing, is notoriously difficult to quantify and categorize (for example, the story of the Vanishing Hitchhiker is clearly an urban legend—but is a forwarded email warning about a mall rapist? Or what about a true news story about a woman who microwaved her dog?). To help with this, Brunvand offers

a useful Type Index of Urban Legends, categorizing various legends according to theme.

The Encyclopedia of Urban Legends also helps clarify what exactly is meant by "urban legend"; the public often uses the term overly broadly. As Brunvand notes in his introduction, "I am not including plotless rumors, gossip, bits of misinformation, etc. Although these materials share some of the same features as urban legends they are not technically in the same genre, even though a few such borderline cases do merit mention in some of my entries" (xxvii).

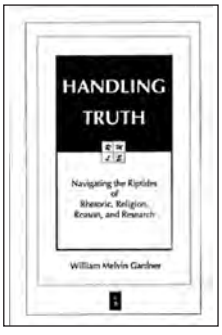
Folklore often informs skeptical investigation, and it has been invaluable in my research into such varied topics as ghosts, djinn (genies), lake monsters, kidney-theft rumors, chupacabra mythology, and Halloween poisoned candy scares. Just about every paranormal or "unexplained" subject (whether objectively real or not) has a robust and rich mythology surrounding it; without at least a passing knowledge of its folkloric aspects, an investigation is incomplete at best.

Accessible enough for the casual reader yet scholarly enough for academic researchers, *The Encyclopedia of Urban Legends* is an invaluable and fascinating book that merits a place on the shelf of any skeptic and student of folklore. The book is currently priced as an academic book but will hopefully be issued in a cheaper edition next year.

Benjamin Radford is deputy editor of the SKEPTICAL INQUIRER and a member of the American Folklore Society.

Four Realms of Inquiry

RICHARD BOND



Handling Truth. By William Gardner. Logica Books, Fairhope, Alabama, 2012. ISBN: 978-0-9761875-1-6. 191pp. Softcover, $12.95.

In the political season the first victim of public discourse is often the truth. Indeed, Glenn Beck goes so far as to argue that all politicians are liars. That is one of the things that makes William Gardner's book *Handling Truth* so relevant to the contemporary discussion. In stark contrast to Beck, Gardner's book demonstrates a first-class intellect, careful research, unbiased judgments, and compelling insights in the author's analysis of the applicability of truth to social and political institutional arrangements.

Traditionally, in philosophy truth has been discussed in terms of four basic categories: Coherence Theory of Truth, Correspondence Theory of Truth, Performative Theory of Truth, and Pragmatic Theory of Truth. While the distinctions between these various theories are significant in defining philosophical understandings of truth, it is difficult for the average person to grasp the importance of the differences or how they apply to an individual's life.

The tests of truth differ among the four domains, and as a consequence the truths of one domain often contradict the truths of another.

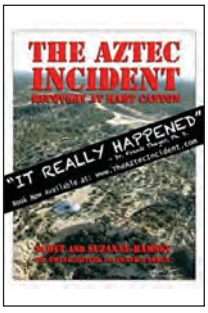
Gardner makes that understanding possible in a way traditional philosophy does not in his distinctions between truth in the realms of rhetoric, religion, reason, and research. He has a unique ability to take a complex philosophical topic and make it clear and readily understandable. These four distinct domains of intellectual inquiry are differentiated by their respective methods for establishing truth. In the domain of rhetoric, *Rhetorica*, statements are advanced or discredited by the process of persuasion and debate. In the religious realm, *Mystica*, truths are articles of faith or beliefs arising from and tested by mystical processes such as spiritual revelation. In the realm of reason, *Logica*, truths are inferences or proofs that have been validated with the methods of logic. In the realm of research, *Empirica*, truths are empirical findings confirmed and documented by research. The tests of truth differ among the four domains, and as a consequence the truths of one domain often contradict the truths of another. For example, spiritual revelation and scientific research take us along totally different paths to truth, and we arrive not just at different truths but at different types of truth. Understanding our differences in these terms helps make sense of the conflicts so evident in our contemporary society.

Handling Truth should be of interest to anyone involved in psychology or politics, as well as those who have an interest in philosophy. ■

Richard Bond is a retired professor of philosophy from Ramapo College of New Jersey. Email: jbondrbond@bellsouth.net

Aztec Saucer Crash Story Rises from the Dead?

ROBERT SHEAFFER



The Aztec Incident. By Scott Ramsey, Suzanne Ramsey, Frank Thayer, and Frank Warren. Foreword by Stanton Friedman. Aztec.48 Productions, Mooresville, North Carolina, 2012. ISBN: 978-0-9850046-0-6. 221 pp. $24.95.

The famous Roswell Saucer Crash claim was born—and died—in the span of about a twenty-four-hour newspaper cycle in July of 1947. The story was dead and forgotten for about thirty years, even among those few who believed in saucer crashes, until Charles Berlitz and William Moore's book *The Roswell Incident* brought it back to life. Since then, the Roswell story has reached critical mass, and thus will never again be forgotten or ignored, no matter what the facts have revealed about the case.

A second saucer crash is supposed to have occurred in New Mexico at Aztec in 1948. The source of that story was the 1950 book *Behind the Flying Saucers* by *Variety* columnist Frank Scully. That claim had a somewhat longer run, lasting until 1952 when San Francisco journalist J.P. Cahn convinced the editor of *True* magazine that the Scully saucer crash story was either the greatest event—or the greatest hoax—of modern times. The editor agreed; the result was a long investigation culminating in two lengthy and devastating articles in *True*. Cahn proved that Scully's sources, Silas Newton and Leo Gebauer, were conmen who swindled people by claiming to have devices for finding oil and minerals in the ground.

In fact, so successful was Cahn's demolition of the Newton/Gebauer story that claims of "saucer crashes" were ignored until at least the mid-1970s. In 1987, UFO researcher William Steinman published *UFO Crash at Aztec*, which tried to legitimize that claim. Steinman's book got very little respect—even Stanton Friedman didn't buy it (for which Friedman apologizes, blaming his earlier rejection of the book on absurd statements made by Steinman's coauthor, the late Wendelle Stevens). In 1998, the first annual UFO Conference was held to benefit the Aztec Public Library. The last conference was held in 2011; there wasn't enough interest to continue in 2012. The Aztec crash seemed to be a hoax, and that was the end of the story.

"Not so fast!" say Scott and Suzanne Ramsey. Having spent over $500,000 of their own money over a period of twenty-five years, traveling to twenty-seven states and collecting over 55,000 documents, the Ramseys claim in their book *The Aztec Incident* that there are first- and (mostly) second-hand witnesses to the crash retrieval operation, and that the honest and successful oilman Silas Newton was pretty much framed by J.P. Cahn, who wanted to discredit the crash story and especially discredit Frank Scully.

"Eight months after Roswell," on March 25, 1948, some oil workers went out to battle a supposed brush fire near a company site but instead discovered that "a very large metallic lens-shaped craft sat silently atop the mesa." They found that there were at least two dead bodies inside the craft—beings that were small but otherwise entirely human. Soon a military helicopter hovered overhead, and soldiers arrived. Eventually there were up to two hundred persons involved in the recovery of the craft, an effort that lasted two weeks. However, no word of the project reached the local press or community leaders, probably because, as one man explained, "we were threatened with our lives if we ever spoke out about this."

One of the government scientists who supposedly studied the crashed saucer was a mysterious "Doctor Gee" (obviously Gebauer despite his and others' denial), who let his friend, oilman Silas Newton, in on the secret as they were driving around trying out a magnetic device for detecting "microwaves" supposedly emitted by oil in the ground. Doctor Gee claimed to be a "master of magnetic energy" and to have worked on a device called a magnetron that "knocked out as many as seventeen Japanese submarines in one day." The saucers, according to Newton, probably originated on Venus and used magnetic propulsion to travel along "Magnetic Lines of Force which originate in the sun and revolve around their planets and their moons, keeping the universe in magnetic balance." The Ramseys don't seem to realize that these statements are pseudoscientific gibberish.

For some reason, the magnetic prospectors drove directly to Frank Scully's house in Hollywood (Newton also lived in Hollywood and had been in contact with Scully), where they regaled him with tales about saucers, including the one that crashed in Aztec.

Newton, according to the Ramseys, has gotten a bum rap from Cahn. His apparently "questionable" business deals were "nothing new, as the oil business always has a high level of risk. . . . Newton's investors were, in the main, all quite happy, as court records show." (Of course, conmen like Newton typically use money from new investors to pay off earlier investors who threaten to complain to the law.) When Scully refused Cahn's fervent offer to buy the whole story for the *San Francisco Chronicle*, say *The Aztec Incident*'s authors, Cahn set out to destroy the Aztec crash story—and Newton, Gebauer, and Scully along with it. The

authors claim that the accusations Cahn made to the FBI "resulted in the malicious prosecution of Newton and his friend Leo Gebauer—a prosecution based in envy and a relentless vendetta."

The FBI, however, takes a different view. Official government records at http://vault.fbi.gov/silas-newton contain "the FBI's investigations into Newton's fraudulent activities between 1951 and 1970." According to the FBI, "Silas Newton (1887–1972) was a wealthy oil producer and con-man who claimed that he had a gadget that could detect minerals and oil." Newton's first arrest was as far back as 1931, with many more arrests following. In 1970, Newton pleaded guilty in Los Angeles to illegal securities sales (but was allowed to withdraw that plea after making restitution to the investor) and was also under investigation for an alleged mining fraud in New Mexico two years before his death at age eighty-five. And the authors state that "the FBI is still withholding over 211 pages concerning Silas Newton." Would you buy a used saucer from that man? (By comparison, J.P. Cahn has never been in trouble with the law as far as I am aware.)

In Frank Scully's "Private and Confidential Memo on J.P. Cahn," dated June 15, 1952, and forwarded to the attorney for Newton, some inflammatory accusations were made. Scully claimed that Cahn was "trying out blackmail on me, for size . . . he even confessed that he had gone in for some larceny to strengthen his case. . . . He proved himself a louse in the blouse of journalism, a dangerous man."

However, this memo was almost certainly dictated by Scully under the direction of his attorney. Thus it must be read not as "here is what happened" but instead "here is what we'll say in court, if the matter lands there." It cannot be taken as unbiased fact. The next time you are in a courtroom, note that while witnesses are placed under oath, the attorneys never are, and thus are under no real obligation to tell "the truth, the whole truth, and nothing but the truth."

I knew Cahn during the 1980s and 90s. I agree that he had a brash and self-promoting personality, and I can well imagine the verbal battles between the caged combatants Cahn and Frank and Alice Scully as they made the slow drive from Los Angeles to Palomar Mountain to see discredited UFO photographer George Adamski. (The Scullys were Adamski supporters). Cahn wanted Scully to admit that he had been duped and to write an article admitting it. He told Scully: "The fact is, Frank, the information you accepted and passed on to your readers in good faith is not what you were led to believe it was. Gebauer is not one of the nation's 'top scientists.'" Cahn was urging Scully to protect his reputation and admit he had been hoaxed. But in *Behind the Flying Saucers* we find Scully surprisingly unconcerned about his reputation: "It is generally believed that to be any party to a hoax spells ruin, once the hoax is exposed. Nothing is further from the facts." Scully remarks that he formerly wrote for the sensationalist *New York Sun*, which expired with great "notoriety" about which he seems rather proud. Read all of *Behind the Flying Saucers* (available as a free e-book at scribd.com) and you will realize the obvious: Scully was a true believer in flying saucers, as well as a dedicated follower of Charles Fort, and probably no evidence to the contrary would ever have changed his mind.

Was Cahn motivated by "envy and a relentless vendetta?" I absolutely do not think so. I always suspected that old Jape (as he was called) was fond of Scully and went too easy on him. Cahn *always* emphasized that Scully was not himself a hoaxer but had been hoaxed. My webpage http://debunker.com/Scully.html contains a lot of in-depth information on the Scully controversy, including what is probably the only recording of J.P. Cahn discussing his investigations. The Ramseys have misrepresented Cahn's feelings about Scully. Cahn told the Bay Area Skeptics that "Frank [Scully] turned out to be an absolutely super guy. . . . And he was outraged, absolutely outraged, that I would question this" crashed saucer story. An honest man telling a hard-to-believe tale expects to be met with incredulity, but a scoundrel is outraged at encountering reasonable doubt.

Whether or not you agree with the authors' interpretations and conclusions, you have to admire their zeal for investigation. This is one of the best-documented UFO books I have ever seen. There are documents from the FBI archives, Air Force archive documents, news clippings, and most important, the documents from the Frank Scully Collection at the American Heritage Center at the University of Wyoming (that no researcher previously realized existed!). They even found a transcript of the interview of Denver radio ad salesman George Koehler, an associate of Newton, by two Air Force Office of Special Investigations men, a recording that Scully boasts of having erased to thwart those he calls the "Pentagonians." In 1950, the Air Force was clearly still concerned that flying saucers might represent something real and wanted to find out the truth.

Regardless of what flaws might or might not have existed in the characters of Newton, Gebauer, Cahn, and Scully, many problems remain: there is no physical or documentary evidence of any extraordinary object landing near Aztec in 1948; the "scientific" theories expounded by Newton and Gebauer are pseudoscientific claptrap (no real scientists were the source of this information, thus Gebauer is lying about working as a top government scientist); and Newton's claim to operate an electronic device he would carry around the desert to locate oil and minerals was likewise fraudulent because such devices do not exist. Anyone who wants to rehabilitate the claims of a saucer crash at Aztec needs to explain why we should believe obvious liars like Newton and Gebauer before worrying about who squabbled with whom over publication rights. ■

Robert Sheaffer's "Psychic Vibrations" column has appeared in the SKEPTICAL INQUIRER for more than thirty years; its highlights have now been published as a book (Create Space 2011). Sheaffer blogs at www.BadUFOs.com, and his website is www.debunker.com.

Vegetarian T. Rex? | Enfield Poltergeist | 'Fly'ing Saucer Video | Creationism Laws | Kahneman's Thinking, Fast and Slow
Skeptical Inquirer
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SPECIAL SECTION
MYSTERY ILLNESS
Is Social Networking Spreading Mass Hysteria?
AIDS Denialism
Psychology of the 'Unexplained'
Political Myths
Why the GOP Distrusts Science

Spreading Social Disorders?

Robert Bartholomew's "'Mystery Illness' in Western New York" (SI, July/August 2012) provides an interesting overview of conversion disorders and mass hysteria, focusing on the Le Roy affair. However, he provides very little evidence, other than the cases were scattered through the school and the "affair" occurred after the development of Internet social media for his conjecture that the contagion of mass hysteria at Le Roy was spread by Internet social media. His speculation may be an example of Jesse Richardson's second of "The Top 20 Logical Fallacies": "false cause: presuming that a real or perceived relationship between things means that one is the cause of the other."

David W. Briggs
Marion, Massachusetts

Robert Bartholomew replies:

The social patterning in Le Roy is highly unusual in the annals of the literature on mass psychogenic illness. Several statements in the press point toward social media being the pivotal factor in the atypical spread of symptoms, exacerbated by the national media fanfare surrounding the episode. Those medical professionals with the most detailed, intimate knowledge of the victims note the important role played by both the social media and the news media. The neurologists at the Dent Institute who have treated a majority of victims, report that "Of the 12 we regularly follow, 11 are free of tics and vocalizations. One patient had symptoms which preceded the onset of this event by over a year, so there are other issues there but even so, she states she is 90% improved. The only treatment provided was behavior modification/counseling, treatment for muscle pain, and at times antianxiety or antidepressant medication. As soon as the media coverage stopped, they all began to rapidly improve and are doing very well." These same neurologists affirm the key role of social media in spreading symptoms.

Top 20 Logical Fallacies

I like the article on "The Top 20 Logical Fallacies" by Jesse Richardson (SI, July/August 2012). However, I would like to add number 21 to the list of logical fallacies: *Improper Analogy.*

The method is that instead of proving the original point, an analogy is presented that is inapplicable but easy to prove.

An example is: "Premarital sex is like baseball; in the end one of the two loses." Seen as on a billboard in this or a similar form near Ardmore, Oklahoma.

Manfred Cuntz
Associate Professor of Physics
Department of Physics
University of Texas at Arlington

Why the GOP Distrusts Science

I was dismayed to find Chris Mooney's article "Why the GOP Distrusts Science" in SI (July/August 2012). This is an example of the kind of thing that SI is trying to educate against: politics masquerading as science.

The article smacks of the same techniques used by the very organizations he vilifies, such as the Cato Institute and Heritage Foundation. Surveys can be constructed so as to draw whatever conclusion is desired, especially when dealing with something as complex as the thinking process going on within a very large group of people. I'm sure these organizations can provide similar analyses of surveys to show just the opposite of Mr. Mooney's thesis, and both sides would argue that theirs is the more scientific approach, when in reality neither is. Terms such as "rigidity" and "authoritarianism" are political, not scientific. They can be used to describe both liberal and conservative thinking. For example, while more conservatives may be skeptical of global warming science, more liberals are skeptical of science that implies the efficacy and safety of nuclear power. While claiming authoritarianism in conservative thought for wanting to ban marijuana, liberal ideology has no problem with banning sugary soda.

It's not that I believe that articles of this nature are useless or should not be published. The topics are well worth discussing. It's just that they belong in a political forum not a scientific one such as SI. Please, Editors, let's stick to science!

Allen Ginzburg
Aptos, California

In Chris Mooney's article, "Why the GOP Distrusts Science," he states that, "They're wrong and also sure of themselves." Reading that I was reminded of Walter Mondale's quip on Ronald Reagan: "It's not the things he doesn't know that bother me, it's the things he is so sure of that just aren't so."

Brian Gibney
Brookfield, Connecticut

Chris Mooney and the research he cites assume the "authoritarian" nature of "conservatives." Aside from the insidious appellation of "authoritarian" implying fascist ideologies, Mr. Mooney analyzes only half the equation: What's wrong with the "conservatives?" Where is any inquisitiveness about the other half of the underlying question: What could possibly be wrong with Mr. Mooney's brand of science reporting in his approach to the community at large and, especially, to conservatives? Are the Democrats, good little presump-

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tive accepters of science that they are, taking scientific conclusions and applying them to promote political agendas that do not necessarily follow the "science"? Are scientists crossing the line from explaining or reporting science into the area of human law, to force social, political, or economic mandates? Are the insults of Mooney and his ilk counterproductive to dialogue and education?

Mr. Mooney includes in his analysis-by-half of the "political phenomena" of why "Republicans" distrust scientists by, among other things, stating conservatives are not only wrong but are "sure of themselves." He distinguishes the superior non-authoritarians (presumably persons such as himself) by proudly asserting "uncertainty is the lifeblood of science." Yet he fails to give the slightest consideration of how he contributes to the weaknesses he perceives in the "Republican" perspective toward science, politics, social issues, and economics. How is ignoring half of the equation a demonstration of any uncertainty on his part? It would seem that he entered into his project to prove his preconceived conclusion rather than to truly research any "uncertainty" and consider the whole of the system he purports is under analysis.

Kevan Karraker
Farmington, Missouri

As a longtime Republican and life-long proponent of the advancement of human knowledge, it is discouraging to see the article "Why the GOP Distrusts Science" in your fine publication. Many of us are skeptical of the necessity of central planning to improve the lot of the human race. The real authoritarians are those who would try to control our actions because of scientific "proof" that they know what is good for us or our planet.

These debates (funding of embryonic stem cell research and industrial production, etc.) are public policy debates. Science can inform, but must not decide, public policy.

Walter Rountree
Anaheim, California

I read with great interest Chris Mooney's article "Why the GOP Distrusts Science." I agree with his conclusion about the authoritarian personality concept. Years ago I read about "psychological closure," a concept that discusses how all people need closure (certainty) in the face of ambiguity. Some need it a lot more than others, while some handle ambiguity and the illogical facets of life without feeling quite so threatened.

I think, though, that there are additional forces at work, the most important being that many conservative authoritarian types feel threatened by science. Evolution is a big threat, witness "Creationism" and "Creation Science," attempts to scientifically justify the biblical Book of Genesis's account of creation.

It's my view that conservatives feel that liberals, especially in the form of U.S. Federal Courts, who have shut down the teaching of Creationism as science, limited prayer in public schools, and objected to manger scenes and the Ten Commandments in government buildings, are a threat to their very way of life. The more they feel they need the security of their beliefs in a chaotic and ever-changing world, the more they feel threatened.

Philip Wylie, a science-fiction writer in the 1950s and 1960s, wrote an essay in which he suggested that just as human beings defend their physical territory, they defend their mental, psychological, or conceptual territory: the beliefs that they use to structure and make sense of their reality.

Kenneth Ciszewski
Overland, Missouri

In "Why the GOP Distrusts Science" Chris Mooney incorrectly identifies the Cato Institute as a conservative think tank. Cato does support many of the fiscal and regulatory policies associated with the right. But they also strongly support gay marriage, ending the war on drugs, civil liberties, open immigration, withdrawal from Iraq and Afghanistan, and many other traditionally liberal causes.

Cato's political positions are actually libertarian, a philosophy that stresses natural rights, limited government, and the dignity of the individual. This puts Cato at odds with extremists on both ends of the political spectrum. However, their "socially liberal, fiscally conservative, personally responsible" stance appeals to a large and growing portion of American society.

By lumping Cato in with the Heritage Foundation and other conservative organizations, Mooney perpetuates the "left vs. right" false dichotomy that has soured American politics and excludes other viewpoints from the debate.

Steve Fritzinger
Fairfax, Virginia

Many more readers submitted letters about Chris Mooney's article than we have space to print. We thank all who wrote. Please also note Ronald A. Lindsay, "Are Conservatives and Liberals Different People?" in our subsequent September/October 2012 issue. It is a critical examination of Mooney's central hypothesis. — EDITOR

F-117 vs. B-2

I have been a subscriber since Vol. I No. 2 of *The Zetetic*. The *Skeptical Inquirer* article "Stairway to Heaven" by Massimo Polidoro (SI, July/August 2012) caught my eye mainly because of the photos. I worked in avionics RDT&E for the U.S. Navy for thirty years, and airplane photos get my immediate attention. When I read the accompanying article I was taken aback by what I consider to be the somewhat serious factual inaccuracies.

The photos show plan view silhouettes of a B-2 stealth bomber called the Spirit. It was introduced into service in 1997 and did not take part in the first gulf war. The stealth aircraft that did play a role in that conflict was the F-117 Nighthawk. The B-2 has four turbofan engines and no tail whatsoever—the function of the tail is assumed by "flaperons." The F-117 does not have a dual-tail structure and has two turbofan engines. The F-117 was introduced into service in 1983.

Mr. Polidoro appears to have introduced a little imagination and confusion into his article by attributing characteristics of the F-117 to the B-2. Obviously the B-2 was not the first stealth aircraft, following the F-117 by a decade and a half.

Ordinarily I would brush off such confusion of facts except for considering the publication in which it is contained. Phil Klass would roll over in his grave.

J.A. Dunn
Warminster, Pennsylvania

"Stairway to Heaven" conflates the B-2 Spirit stealth bomber with the F-117 Nighthawk stealth ground-attack aircraft. All the photos are of the B-2 and are labeled as such, but the aircraft that participated in the first Iraq war was the F-117, not the B-2. The paragraph goes on to describe the aircraft as a "fighter," which is both correct (describes the aircraft that flew) and incorrect (describing the B-2 that way). Finally, the aircraft that the author saw in the early 1980s must have been the F-117 Nighthawk, because the B-2 Spirit didn't fly until 1989.

Howard J. Wilk
Philadelphia, Pennsylvania

I was rather puzzled by several features of the "Stairway to Heaven" column. First of all, Polidoro claims to have seen a B-2 Spirit in the early 1980s in Italy. This is highly unlikely, as the B-2 first flew on July 17, 1989, in Palmdale, California. Furthermore, the U.S. Air Force did not take delivery of their first B-2 until 1993. As the B-2 did not attain operational status until January 1997, it missed the first Iraq War by several years. Additionally, whether or not an aircraft has afterburner equipped engines has nothing whatsoever to do with that aircraft leaving vapor trails. Most vapor trails seen are generated by turbofan powered commercial airliners, although they are not uncommon with turboprop or piston-engined aircraft; the determining factors being ambient air temperature and relative humidity. As if this were not enough, the B-2 has four, rather than two engines, is a strategic bomber rather than a fighter, and the B-2 is not the first aircraft with stealth technology, the first being the F-117 Nighthawk, which is a twin-engined aircraft that was operational in the early 1980s, but bears only a passing resemblance to the B-2, and most definitely does not have the "three step" appearance of the B-2.

John Szczepanski
Tampa, Florida

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POINT OF INQUIRY
WITH CHRIS MOONEY & INDRE VISKONTAS

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Readers Dunn, Wilk, Szczepanski, and numerous others who also wrote are correct. We accidentally ended up conflating the F-117 stealth fighter and the later B-2 stealth bomber. The column's author wrote correctly in his submitted text about the F-117. But it was noticed in production that the images he submitted were actually of the B-2. Short on time, an editor made an assumption and mistakenly changed all the column text to refer to the B-2. We are sorry for the confusion. —EDITOR

The Concept of Race

Kenneth Krause (Science Watch, "Besieging the Last Bastions of Race," SI, July/August 2012) has got bogged down in a definition of race that only considers genetic factors. As a result he indulges in wishful thinking.

Barack Obama's election as President was tremendously significant—because of his race. The major conflict within the United States last century was the civil rights struggle, a racial struggle. The basis was a biological factor: skin color. But the importance and problems were because of associated nonbiological factors: the loaded history, culture, and discrimination associated with skin color.

In medicine, classification by race remains useful and important in examining the large differences in rates of conditions (e.g., hypertension and obesity) and use of services, although the reasons are mainly cultural (diet, etc.) and economic (poverty). That the most often used and most useful "racial" classification in American medical literature includes an "ethnic" category (black, white, Hispanic, and Asian) emphasizes that the differences are as much cultural as biological.

That rates of schizophrenia are up to fourteen-times higher in Afro-Caribbeans (but not South Asians) than the local whites in the United Kingdom, almost certainly related to discrimination and acculturation, contributes greatly to understanding the nature and causes of schizophrenia and demonstrates the importance of looking at race.

Thus, the concept of race remains both important and useful. In denying it Kenneth Krause is denying reality—both his own and the world's.

Nigel Bark, MD
Bronx Psychiatric Center
Bronx, New York

It is now fashionable for liberals to conclude that since race and racism have been used for evil purposes, statistically distinct human races do not exist.

I use *The Merriam-Webster* definition of race, as Krause gives no definition for what he says does not exist. Race is "a division of mankind possessing traits that are transmissible by descent and sufficient to characterize it as a distinct human type." As in most biological definitions, this does not mean that all individuals can be uniquely categorized but that most can. The morning after reading Krause's piece, an article in our hometown newspaper described a local athlete and academic star who was a favorite to make the U.S. Olympic Team. Looking at the athlete's picture I concluded: female of predominantly sub-Saharan, West African descent. Gender is not always a yes or no situation, as approximately one child in 2,000 is born with ambiguous gender identity and gender can be modified surgically and hormonally. That does not provide a scientific basis for not using gender in categorizing people. Similarly for race.

Robert B. Kelman
kelman6@comcast.net

Kenneth W. Krause replies:

The writers apparently assume that I fear a credible foundation for "race"—perhaps because of a misguided, paternalistic desire to avoid the concept's misuse or, more likely, due to an ideological craving to force equality where none exists. But I am neither a paternalist nor an egalitarian. As biologist Bruce Lahn recently warned, science might soon reveal non-trivial variations between human groups. So be it, I say. But such groups will never correspond to current or past notions of races.

Many have asked generally how I can ignore physical differences in plain sight. I don't deny that some people have darker skin than others, for example. Rather, I deny only that such differences imply or warrant racial classifications. To be "black," exactly how dark does one's skin need to be? How curly her hair, wide her nose, and thick her lips? Are the writers prepared to do what no expert has ever done—quantify such traits to the point of scientific reliability?

In Race: Debunking a Scientific Myth, *paleontologist Ian Tattersal and geneticist Rob DeSalle characterized racial classifications as both unworkable and unremarkable, requiring "no special explanation" from science. To Bark and other devotees to racialized medicine, Tattersal and DeSalle respond with two observations. First, because racial groups are culturally and not scientifically defined, statistical risk factors cannot reliably apply to individuals. Second, doctors treat individuals, not groups. Despite what some physicians might imagine, they add, race and ancestry are far from equivalent.*

Kelman is similarly mistaken. Gender is different and not scientifically undefinable simply because it can be modified or is sometimes difficult to ascertain. Also,

Kelman's preferred definition of "race" is clearly flawed for two reasons. First, it too equates race and ancestry. Second, no sets of human traits are sufficient to establish races in the real world. I provided no such definition in my column simply because no acceptable definition exists.

Nonetheless, I thank Bark for underscoring my column's primary argument that "race" is nothing more than a cultural phenomenon, both indistinct and ephemeral. Thus, it is truly "all in our heads." I am grateful to Kelman as well for demonstrating the racial idea's insidious nature. Though plainly erroneous, definitions of race still haunt our popular dictionaries.

Leaving the Void Unfilled

Johnson's letter "Emotional Connections" (SI, July/August 2012) with the phrase, "There needs to be an emotional connection ..." set a warning flag for me.

Essential for survival, even if often conflicting, we have evolved two dominant strategies for evaluating information: Type I—Instinctive: Jumping away from the ambiguous shadow or sudden sound allows one to hunt another day. Type II—Analytical: Only careful (read: time consuming) thought allows us to determine the workings of reality.

These two types of thinking employ different parts of the brain. They compete for resources and our attention. For more read: *Science*, 27 April 2012: Vol. 336 no. 6080 pp. 493–496.

Johnson's appeal to an emotional connection to other nonbelievers analogous to the connection found in "the church" is, I think, a step in the wrong direction. If anything, we need to be even more aggressive about advocating using the analytical aspects of our minds. An example of a successful application of this approach is Matt Dillahunty and his collaborators of the Atheist Community of Austin.

Type II is the strategy preferred by most of us in the skeptical community. While this does not mean we exclude Type I processes from our lives and discourse, we tend to be wary of such, particularly during group discussions.

I, for one, have never needed to "fill the void" associated with any interaction I have had with "the church." I like the "void." I like being free to say, "I don't know" rather than get into the trap of making up nonsense to "fill the void."

Warning flag reset.

Robert I. Price
Department of Physics
University of Nebraska
at Kearney

Einstein's Contributions

Thomas Wray (Letters, July/August 2012) opines that Albert Einstein's work was barren after his divorce in 1914, except for the paper on the general theory of relativity in 1916. This claim bears on the question of the contribution of Einstein's first wife to his earlier work. Three factual points need to be made:

1) The general theory of relativity is a backbone concept in science. It revolutionized not only physics but also astronomy and cosmology. If that were Einstein's only contribution in his lifetime it would still mark him as one of the greatest scientists ever. Note also that it, along with the special theory of relativity, is a vital tool in the making of modern global positioning systems.

2) In 1916–1917, Einstein published works on the emission and absorption of light by atoms and molecules that has been central to physics and chemistry ever since. In particular, he established that there are two mechanisms for emission of photons: spontaneous emission, which is independent of the photon density, and stimulated emission, which is proportional to the photon density. The latter mechanism is responsible for the development of the laser.

3) In 1935, Einstein, Podolsky, and Rosen published a paper that is now referred to simply as "EPR." Initially, it was read by very few, but references to it have grown exponentially since then. In this work, they showed that quantum mechanics is not "locally realistic," i.e., it involves what Einstein called "spooky action at a distance." He didn't like it, but it stimulated an ever-increasing avalanche of papers both theoretical and experimental that provide verification of the ideas. It also is fundamental to the development of the idea of quantum computing.

Frankly, many fine scientists would be delighted to trade their life's work for authorship of even one of these three contributions that Einstein made after his divorce.

Alfred Holtzer
Department of Chemistry
Washington University
St. Louis, Missouri

Teaching Is a Profession

I want to thank you for publishing Oliver R. Bishop's letter on teachers unions in the July/August issue. He wrote, "I recall my early years when my teacher arrived early, built the fire in the stove, attended to a fine education for eight graders, swept the floor in the evening, and had time to cinch the saddle on my horse before I rode home."

Even though Mr. Bishop does not mention how many bushels of corn or how many ham hocks she was paid, or was it just free room and board in a log cabin, assuming she was paid at all, he still gives a list of the reasons teachers formed unions. In what other job would someone have been treated that way? If education is to improve, the first thing that has to be done is to treat teachers as a profession, not as part-time janitors or stable hands. Would any one expect a doctor or lawyer to be praised for sweeping floors? Teachers unions may not be perfect, but they sure beat the "Little House on the Prairie" mentality in that letter.

Charles F. Hruska
Brooklyn, New York

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words.** Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@csicop.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122, or fax it to 505-828-2080.

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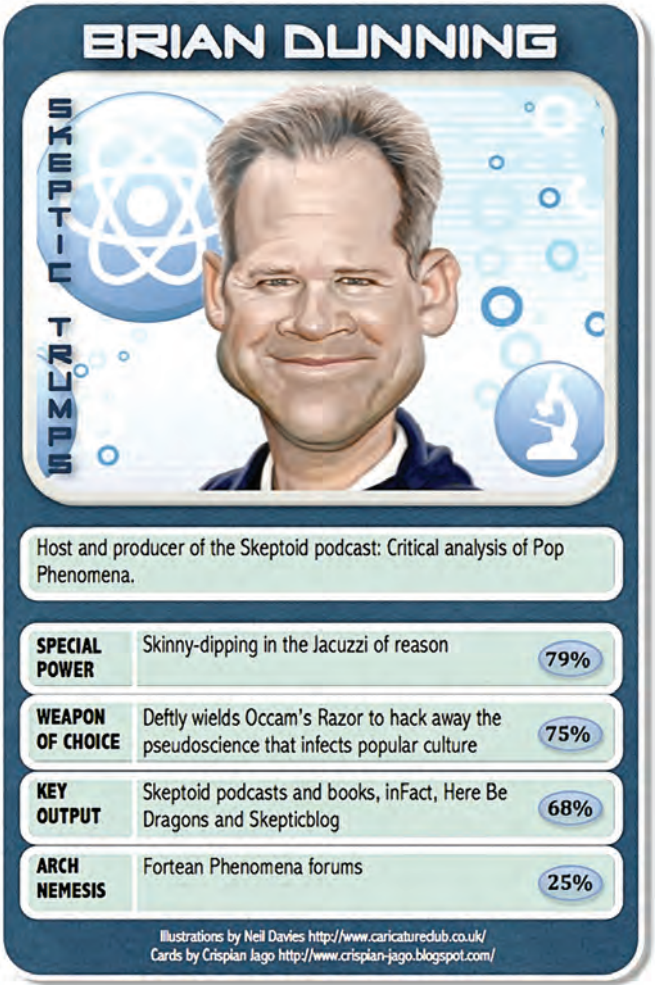
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September/October 2012 Hidden Messages Puzzle Contest Winner: **Izzy Williams**

SKEPTICAL ANNIVERSARIES

by Tim Farley

November 3, 1957: Wilhelm Reich, creator of the pseudoscience "orgonomy," died in prison after being convicted of violating FDA rules.

November 16, 1977: The UFO film *Close Encounters of the Third Kind* was released in the United States.

November 27, 2002: The animated program *South Park* took on TV medium John Edward in an episode titled "The Biggest Douche in the Universe."

November 29, 1922: King Tutankhamen's tomb was officially opened in Egypt. Claims of a curse arose when Lord Carnarvon died in Cairo four months later.

December 4, 1872: A brigantine merchant ship named *Mary Celeste* was discovered abandoned by her crew off Portugal. The mysterious case is sometimes labeled as a Bermuda Triangle case by some sloppy researchers.

December 16, 1997: In a widely reported incident, 12,000 Japanese children reported various symptoms allegedly brought on watching the TV show *Pokémon*.

December 18, 1912: Hominid fossil Piltdown Man was first publicly discussed at a meeting of the Geological Society of London. Decades later it was proven to be a hoax.

December 27, 2002: The company Clonaid (affiliated with the Raëlians) announced that it had successfully cloned a human named "Baby Eve." This was generally regarded to be a hoax.

December 30, 1947: Project Sign, the U.S. Government's first official UFO investigation, was authorized by the U.S. Air Force.

Tim Farley is a research fellow with the James Randi Educational Foundation and created the website whatstheharm.net.

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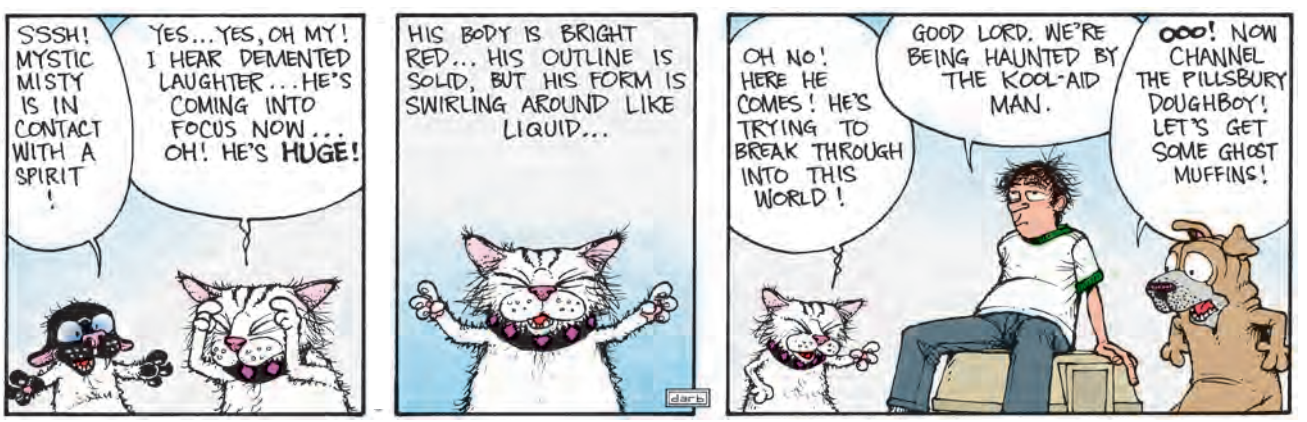
SSSH! MYSTIC MISTY IS IN CONTACT WITH A SPIRIT!
YES...YES, OH MY! I HEAR DEMENTED LAUGHTER...HE'S COMING INTO FOCUS NOW... OH! HE'S HUGE!
HIS BODY IS BRIGHT RED... HIS OUTLINE IS SOLID, BUT HIS FORM IS SWIRLING AROUND LIKE LIQUID...
OH NO! HERE HE COMES! HE'S TRYING TO BREAK THROUGH INTO THIS WORLD!
GOOD LORD. WE'RE BEING HAUNTED BY THE KOOL-AID MAN.
OOO! NOW CHANNEL THE PILLSBURY DOUGHBOY! LET'S GET SOME GHOST MUFFINS!

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astronomer, Southwest Institute for Space
Research, Alamogordo, NM

Clyde F. Herreid,
prof. of biology, SUNY Buffalo

Terence M. Hines,
prof. of psychology,
Pace Univ., Pleasantville, NY

Michael Hutchinson,
author; Skeptical Inquirer
representative, Europe

Philip A. Ianna,
assoc. prof. of astronomy,
Univ. of Virginia

William Jarvis,
prof. of health promotion and public health,
Loma Linda Univ., School of Public Health

I.W. Kelly,
prof. of psychology, Univ. of Saskatchewan,
Canada

Richard H. Lange,
MD, Mohawk Valley Physician
Health Plan, Schenectady, NY

Gerald A. Larue,
prof. of biblical history and
archaeology, Univ. of So. California

William M. London,
California State Univ., Los Angeles

Rebecca Long,
nuclear engineer, president of Georgia
Council Against Health Fraud, Atlanta, GA

Thomas R. McDonough,
lecturer in engineering, Caltech, and SETI
Coordinator of the Planetary Society

James E. McGaha,
astronomer, USAF pilot (ret.)

Chris Mooney,
journalist, author, host of *Point of Inquiry*

Joel A. Moskowitz,
director of medical psychiatry, Calabasas
Mental Health Services, Los Angeles

Matthew C. Nisbet,
assistant professor, School of
Communication, American Univ.

John W. Patterson,
prof. of materials science and
engineering, Iowa State Univ.

James R. Pomerantz,
prof. of psychology, Rice Univ.

Gary P. Posner,
MD, Tampa, FL

Daisie Radner,
prof. of philosophy, SUNY Buffalo

Robert H. Romer,
prof. of physics, Amherst College

Karl Sabbagh,
journalist, Richmond, Surrey, England

Robert J. Samp,
assistant prof. of education and
medicine, Univ. of Wisconsin-Madison

Steven D. Schafersman,
asst. prof. of geology, Miami Univ., OH

Chris Scott,
statistician, London, England

Stuart D. Scott Jr.,
associate prof. of anthropology,
SUNY Buffalo

Erwin M. Segal,
prof. of psychology, SUNY Buffalo

Carla Selby,
anthropologist / archaeologist

Steven N. Shore,
prof. of astrophysics, Univ. of Pisa, Italy

Waclaw Szybalski,
professor, McArdle Laboratory, Univ.
of Wisconsin-Madison

Sarah G. Thomason,
prof. of linguistics, Univ. of Pittsburgh, PA

Tim Trachet,
journalist and science writer, honorary
chairman of SKEPP, Belgium

David Willey,
physics instructor, Univ. of Pittsburgh, PA

Affiliated Organizations | United States

ALABAMA

Alabama Skeptics, Alabama. Emory Kimbrough. Tel.: 205-759-2624. 3550 Watermelon Road, Apt. 28A, Northport, AL 35476

ARIZONA

Tucson Skeptics Inc. Tucson, AZ. James McGaha. Email:mcgaha@skepticus.com. 5100 N. Sabino Foothills Dr., Tucson, AZ 85715

Phoenix Area Skeptics Society (PASS) http://phoenixskeptics.org
Email: phoenixskeptics@gmail.com

Phoenix Skeptics, Phoenix, AZ. Michael Stackpole, P.O. Box 60333, Phoenix, AZ 85082

CALIFORNIA

Sacramento Organization for Rational Thinking (SORT) Sacramento, CA. Ray Spangenburg, co-founder. Tel.: 916-978-0321; Email: kitray2@comcast.net. PO Box 2215, Carmichael, CA 95609-2215 http://home.comcast.net/~kitray2/site/

Bay Area Skeptics (BAS) San Francisco–Bay Area. Eugenie C. Scott, President. 1218 Miluia St., Berkeley, CA 94709. Email: scott@ncse.com. www.BASkeptics.org

Independent Investigations Group (IIG), Center for Inquiry–*West*, 4773 Hollywood Blvd, Los Angeles, CA 90027. Tel.: 323-666-9797. www.iigwest.com

Sacramento Skeptics Society, Sacramento. Terry Sandbek, President. 4300 Auburn Blvd. Suite 206, Sacramento CA 95841. Tel.: 916 489-1774. Email: terry@sandbek.com

San Diego Association for Rational Inquiry (SDARI) President: Paul Wenger. Tel.: 858-292-5635. Program/general information 619-421-5844. www.sdari.org. Postal address: PO Box 623, La Jolla, CA 92038-0623

CONNECTICUT

New England Skeptical Society (NESS) New England. Steven Novella M.D., President. Tel.: 203-281-6277; Email: board@theness.com. 64 Cobblestone Dr., Hamden, CT 06518 www.theness.com

D.C./MARYLAND

National Capital Area Skeptics NCAS, Maryland, D.C., Virginia. D.W. "Chip" Denman. Tel.: 301-587-3827. Email: ncas@ncas.org. PO Box 8428, Silver Spring, MD 20907-8428 http://www.ncas.org

FLORIDA

Tampa Bay Skeptics (TBS) Tampa Bay, Florida. Gary Posner, Executive Director. Tel.: 813-505-7013; Email: tbs@centerforinquiry.net. c/o O'Keefe, 4011 S. Manhattan Ave. #139, Tampa, FL 33611-1277. www.tampabayskeptics.org

The James Randi Educational Foundation. James Randi, Director. Tel: (954)467-1112; Email jref@randi.org. 201 S.E. 12th St. (E. Davie Blvd.), Fort Lauderdale, FL 33316-1815. www.randi.org

ILLINOIS

Rational Examination Association of Lincoln Land (REALL) Illinois. Bob Ladendorf, Chairman. Tel.: 217-546-3475; Email: chairman@reall.org. PO Box 20302, Springfield, IL 62708 www.reall.org

Chicago Skeptics Jennifer Newport, contact person. Email: chicagoskeptics@gmail.com. www.chicagoskeptics.com

LOUISIANA

Baton Rouge Proponents of Rational Inquiry and Scientific Methods (BR-PRISM) Louisiana. Marge Schroth. Tel.: 225-766-4747. 425 Carriage Way, Baton Rouge, LA 70808

MICHIGAN

Great Lakes Skeptics (GLS) SE Michigan. Lorna J. Simmons, Contact person. Tel.: 734-525-5731; Email: Skeptic31@aol.com. 31710 Cowan Road, Apt. 103, Westland, MI 48185-2366

Tri-Cities Skeptics, Michigan. Gary Barker. Tel.: 517-799-4502; Email: barkerg@svol.org. 3596 Butternut St., Saginaw, MI 48604

MINNESOTA

St. Kloud Extraordinary Claim Psychic Teaching Investigating Community (SKEPTIC) St. Cloud, Minnesota. Jerry Mertens. Tel.: 320-255-2138; Email: gmertens@stcloudstate.edu. Jerry Mertens, Psychology Department, 720 4th Ave. S, St. Cloud State Univ., St. Cloud, MN 56301

MISSOURI

Skeptical Society of St. Louis (SSSL) St. Louis, Missouri. Michael Blanford, President. Email: info@skepticalstl.org. 2729 Ann Ave., St. Louis, MO 63104 www.skepticalstl.org

St. Joseph Skeptics
P.O. Box 8908
St. Joseph MO, 64508-8908

NEVADA

Reno Skeptical Society, Inc., Brad Lutts, President. Tel.: (775) 335-5505; Email: info@RenoSkeptics.org. 18124 Wedge Parkway #1052 Reno, Nevada 89511. www.RenoSkeptics.org

NEW MEXICO

New Mexicans for Science and Reason (NMSR) New Mexico. David E. Thomas, President. Tel.: 505-869-9250; Email: nmsrdave@swcp.com. PO Box 1017, Peralta, NM 87042. www.nmsr.org

NEW YORK

New York City Skeptics Michael Feldman, president. PO Box 5122 New York, NY 10185. www.nycskeptics.org

Central New York Skeptics (CNY Skeptics) Syracuse. Lisa Goodlin, President. Tel: (315) 636-6533; Email: info@cnyskeptics.org, cnyskeptics.org PO Box 417, Fayettville, NY 13066

OHIO

Central Ohioans for Rational Inquiry (CORI) Central Ohio. Charlie Hazlett, President. Tel.: 614-878-2742; Email: charlie@hazlett.net. PO Box 282069, Columbus, OH 43228

Cleveland Skeptics Joshua Hunt, Co-Organizer, www.clevelandskeptics.org

South Shore Skeptics (SSS) Cleveland and counties. Jim Kutz. Tel.: 440 942-5543; Email: jimkutz@earthlink.net. PO Box 5083, Cleveland, OH 44101 www.southshoreskeptics.org

Association for Rational Thought (ART) Cincinnati. Roy Auerbach, president. Tel: (513)-731-2774, Email: raa@cinci.rr.com. PO Box 12896, Cincinnati, OH 45212. www.cincinnatiskeptics.org

OREGON

Oregonians for Science and Reason (OASR) Oregon. Jeanine DeNoma, president. Tel.: (541) 745-5026; Email: wilkinsa@peak.org; 39105 Military Rd., Monmouth, OR 97361. www.OASR.org

PENNSYLVANIA

Philadelphia Association for Critical Thinking (PhACT), much of Pennsylvania. Eric Krieg, President. Tel.: 215-885-2089; Email: erickrieg@verizon.net. By mail c/o Ray Haupt, 639 W. Ellet St., Philadelphia PA 19119

TENNESSEE

Rationalists of East Tennessee, East Tennessee. Carl Ledenbecker. Tel.: (865)-982-8687; Email: Aletall@aol.com. 2123 Stonybrook Rd., Louisville, TN 37777

TEXAS

North Texas Skeptics NTS Dallas/Ft Worth area, John Blanton, Secretary. Tel.: (972)-306-3187; Email: skeptic@ntskeptics.org. PO Box 111794, Carrollton, TX 75011-1794. www.ntskeptics.org

VIRGINIA

Science & Reason, Hampton Rds., Virginia. Lawrence Weinstein, Old Dominion Univ.-Physics Dept., Norfolk, VA 23529

WASHINGTON

Seattle Skeptics
www.seattleskeptics.com

The organizations listed above have aims similar to those of the Committee for Skeptical Inquiry but are independent and autonomous. Representatives of these organizations cannot speak on behalf of CSI. Please send updates to Barry Karr, P.O. Box 703, Amherst NY 14226-0703.
International affiliated organizations listed at www.csicop.org.

CENTERS FOR INQUIRY

www.centerforinquiry.net/about/branches

Transnational
3965 Rensch Road, Amherst, NY 14228
Tel.: (716) 636-4869

Austin
PO Box 202164, Austin, TX 78720-2164
Tel.: (512) 919-4115

Chicago
PO Box 7951, Chicago, IL 60680-7951
Tel.: (312) 226-0420

Indianapolis
350 Canal Walk, Suite A, Indianapolis, IN 46202
Tel.: (317) 423-0710

Los Angeles
4773 Hollywood Blvd., Hollywood, CA 90027
Tel.: (323) 666-9797

Michigan
3777 44th Street SE, Grand Rapids, MI 49512
Tel.: (616) 698-2342

New York City
PO Box 26241, Brooklyn, NY 11202
Tel.: (347) 699-0234

San Francisco
email: sf@centerforinquiry.net

Tampa Bay
4011 S. Manhattan Ave. #139, Tampa, FL 33611-1277
Tel.: (813) 505-7013

Washington, DC
921 Pennsylvania Ave. SE, Washington, DC 20003
Tel.: (202) 543-0960

Argentina
Buenos Aires, Argentina
Tel.: +54-11-4704-9437
www.cfiargentina.org

Canada
2 College Street, Suite 214 Toronto, Ontario,
M5G 1K3, Canada

China
China Research Institute for Science Popularization,
NO. 86, Xueyuan Nanlu Haidian Dist., Beijing,
100081 China
Tel.: +86-10-62170515

Egypt
44 Gol Gamal St., Agouza, Giza, Egypt

France
Dr. Henri Broch, Universite of Nice, Faculte des
Sciences, Parc Valrose, 06108, Nice cedex 2,
France Tel.: +33-492-07-63-12

Germany
Arheilger Weg 11, 64380 Rossdorf, Germany
Tel.: +49-6154-695023

India
46 Masi garh, New Friends Colony
New Delhi 110025
Tel.: 91-9868010950

London
Conway Hall, 25 Red Lion Square,
London WC1R 4RL, England

Nepal
Humanist Association of Nepal,
PO Box 5284, Kathmandu Nepal
Tel.: +977-1-4413-345

New Zealand
email: bcooke@centerforinquiry.net

Nigeria
PO Box 25269, Mapo, Ibadan, Oyo State, Nigeria
Tel.: +234-2-2313699

Peru
D. Casanova 430, Lima 14, Peru
email: cipsiperu@yahoo.com

Poland
Lokal Biurowy No. 8, 8 Sapiezynska Sr.,
00-215, Warsaw, Poland

Romania
Fundatia Centrul pentru Constiinta Critica
Tel.: (40)-(0)744-67-67-94
email: CenterforInquiry.Romania@gmail.com

Russia
Dr. Valerii A. Kuvakin, 119899 Russia, Moscow,
Vorobevy Gory, Moscow State Univ.,
Philosophy Department

Senegal
PO Box 15376, Dakar – Fann, Senegal
Tel.: +221-501-13-00